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Shimomura et al.

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(54) **BROADBAND DATA BROADCASTING SERVICE**

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(52) U.S. Cl. **725/63; 725/73; 725/81; 725/110; 725/123**

(58) Field of Search **709/217, 218, 709/219; 455/3.2, 5.1, 6.3; 348/6, 7, 8, 10, 12, 13; 370/465; 725/73, 81, 85, 105, 110, 115, 116-118, 123, 63**

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(57) **ABSTRACT**

A broadband data broadcast system that allows rich multimedia content to be delivered to a plurality of subscribers is disclosed. The broadband data broadcast system operates by multiplexing a plurality of rich multimedia digital information streams together at a centralized data broadcast center. The data broadcast center then broadcasts the multiplexed digital information stream on a broadcast medium such as satellite broadcasts, radio frequency broadcasts, or digital television broadcasts. A large number of receiver systems receive the broadcast signal and demodulate the broadcast signal to retrieve the multiplexed digital stream. The receiver system extracts a subset of digital information streams that the particular receiver system's owner has designated are of interest. The receiver system caches the interesting digital information stream for later access. The receiver system outputs the interesting digital information streams to a client system upon demand. The receiver system may also stream an incoming digital information stream to a client as the stream is received.

20 Claims, 13 Drawing Sheets


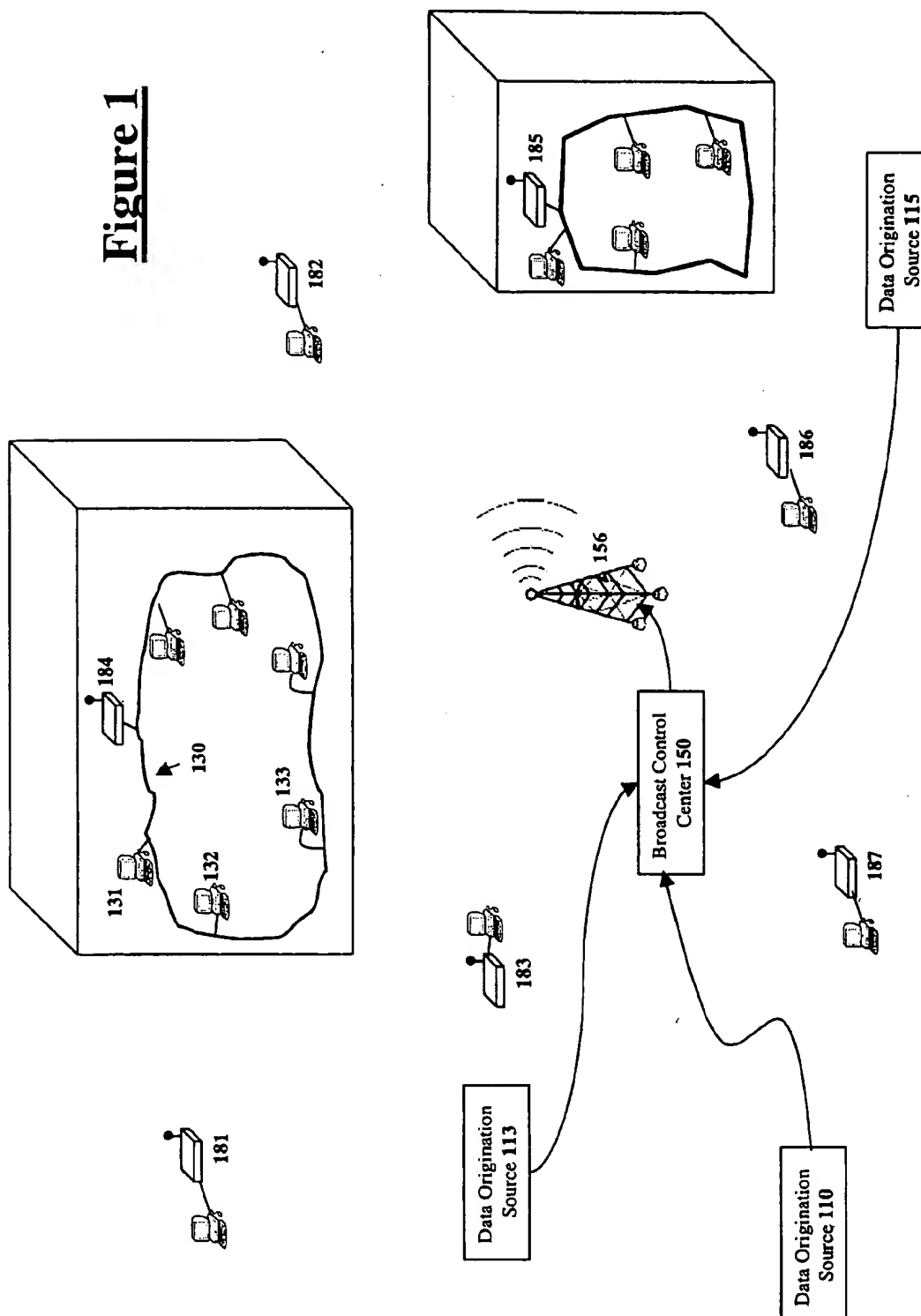
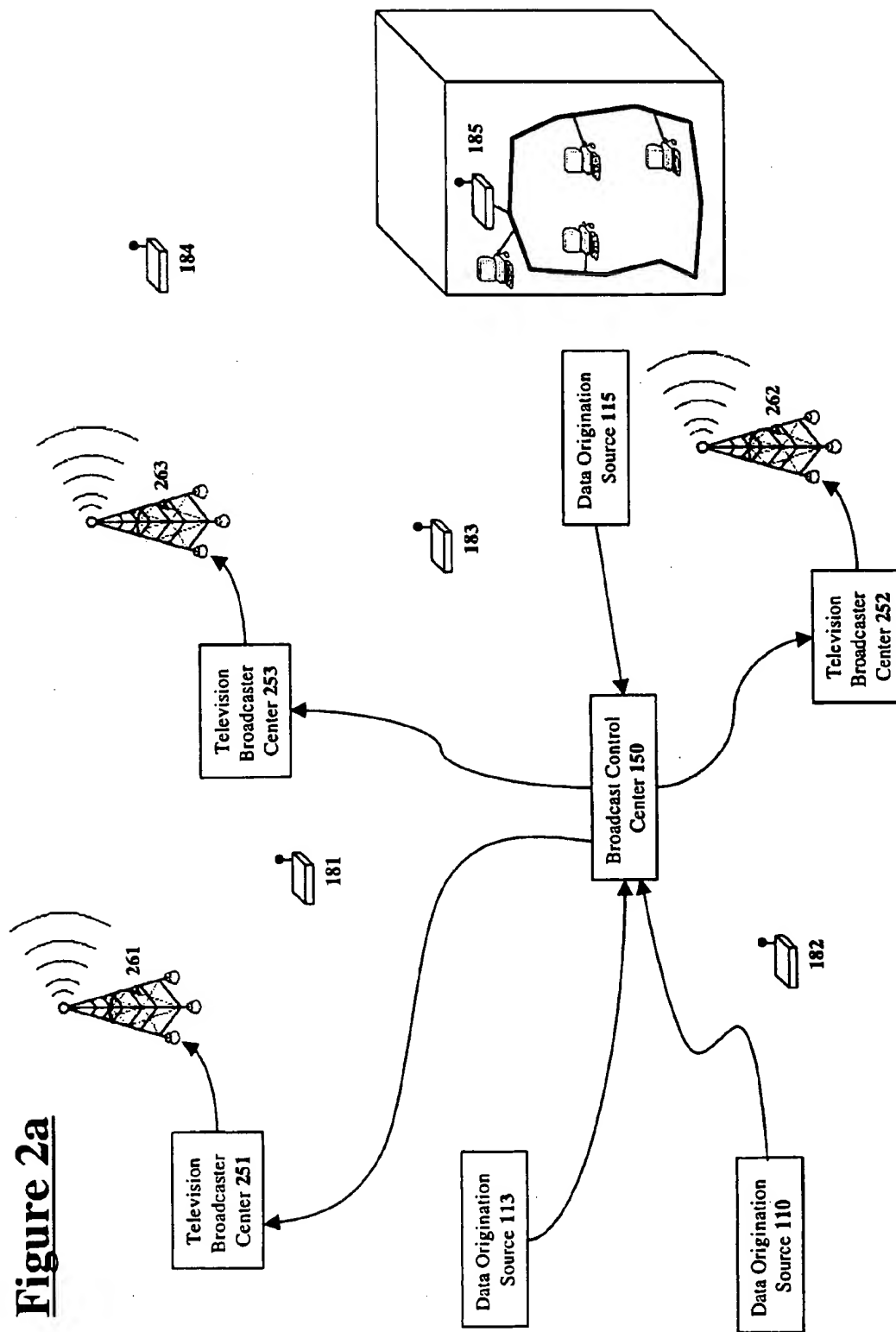
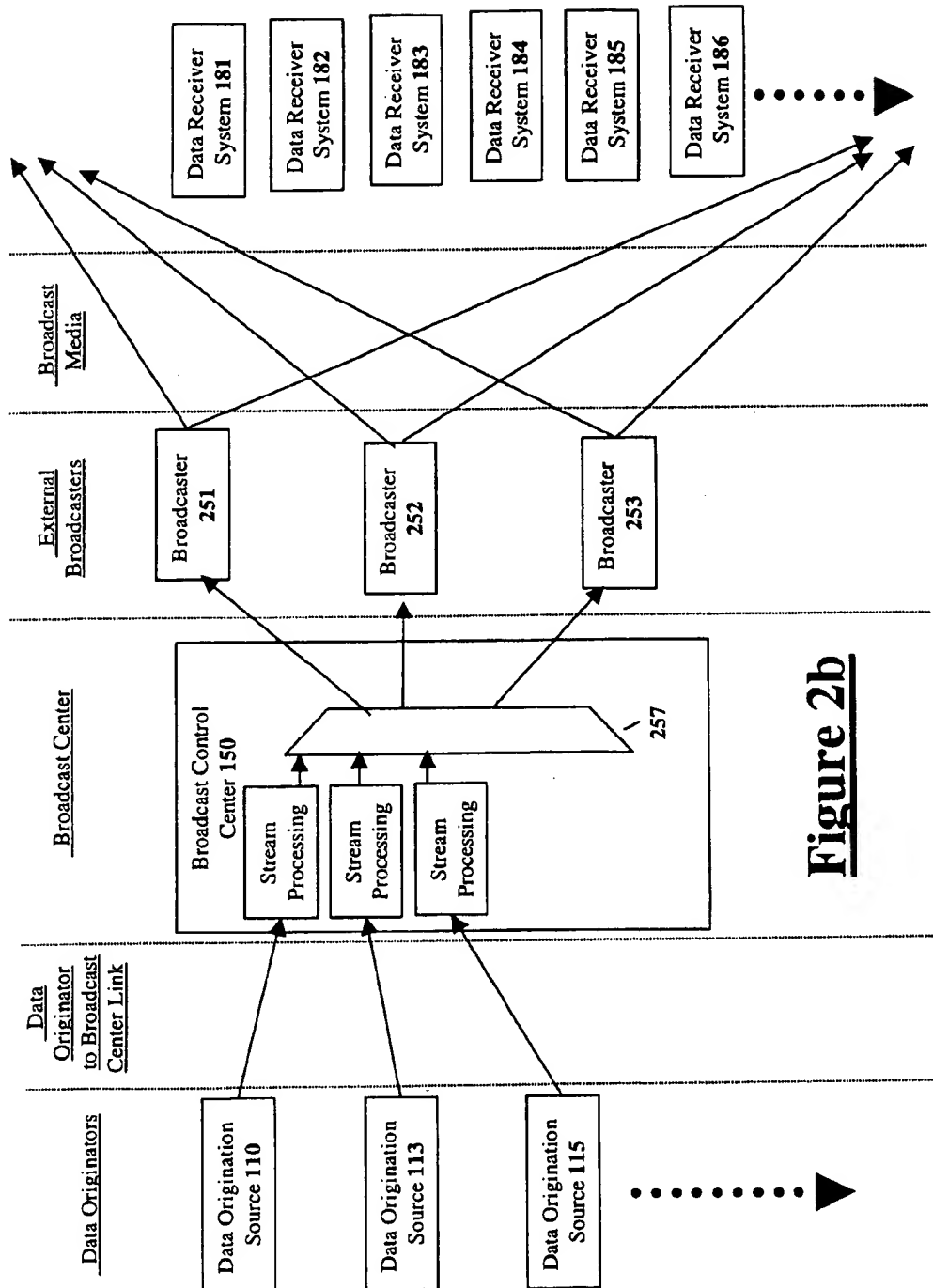
Personal News On-Demand	
<p>Search Result Headlines</p> <ul style="list-style-type: none"> •AOL and Geocast form joint venture •Geocast celebrates 2 million customers •AOL and Geocast talks rumored •No Geocast comment on AOL talks •Wireless fulfills broadband promises •Geocast stock hits new high <p>Possible Related Headlines</p> <ul style="list-style-type: none"> •AOL joins DOW Index •Pointcast generates new strategy •Digital Television sales soar •E! to generate data broadcast content <p>Internet Headlines</p> <ul style="list-style-type: none"> •AOL and Geocast joint venture announced •Geocast hits 2 million customer mark •Rumor: AOL and Geocast? •Geocast stock soars in tech stock rally <p>Local Information News Weather Traffic Sports Entertainment</p>	<p>Geocast and AOL form Joint Venture - (Mountain View, California) - Geocast and on-line giant America Online (AOL) announced a joint venture to distribute rich multimedia information to AOL's customers using Geocast's Geobox wireless broadband data broadcasting service. The joint venture will allow AOL customers to enjoy rich multimedia content delivered without the delays associated with traditional computer networks. Yada yada yada yada ...</p> <p> AOL/Geocast Announcement</p> <p>Search: <input type="text"/></p>

Figure 1





**Figure 2b**

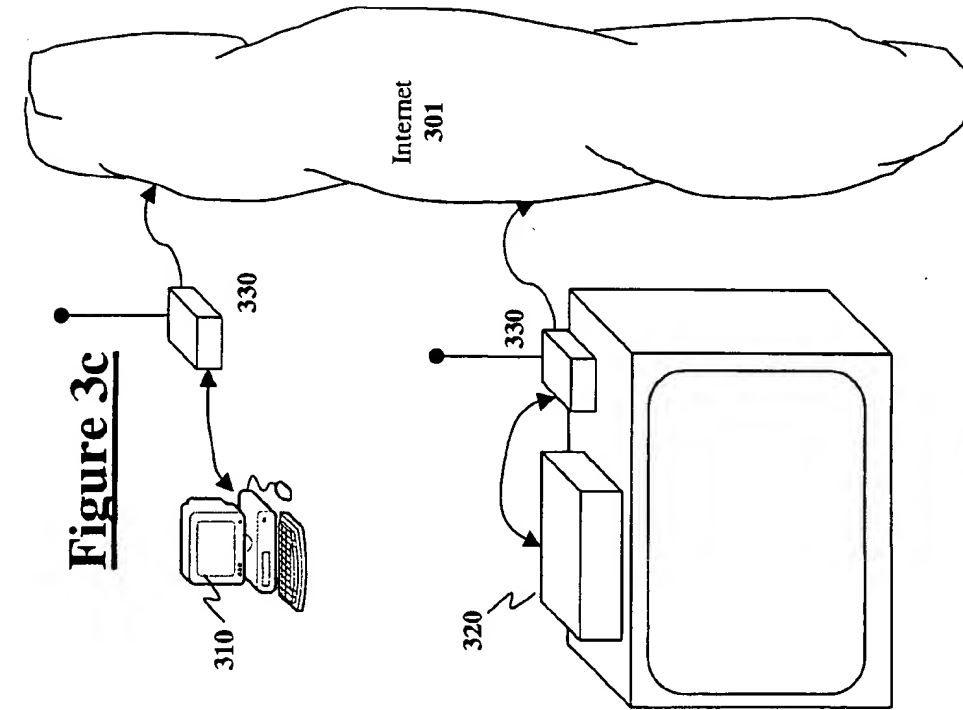


Figure 3a

Figure 3b

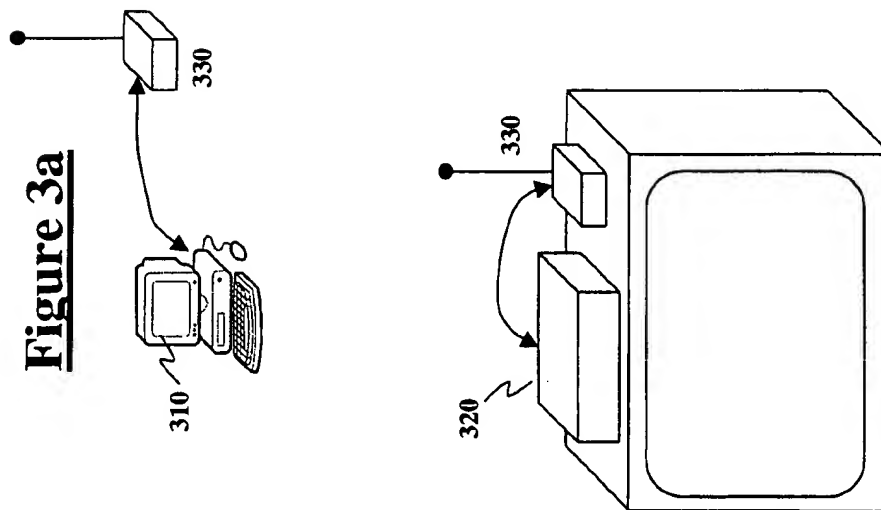
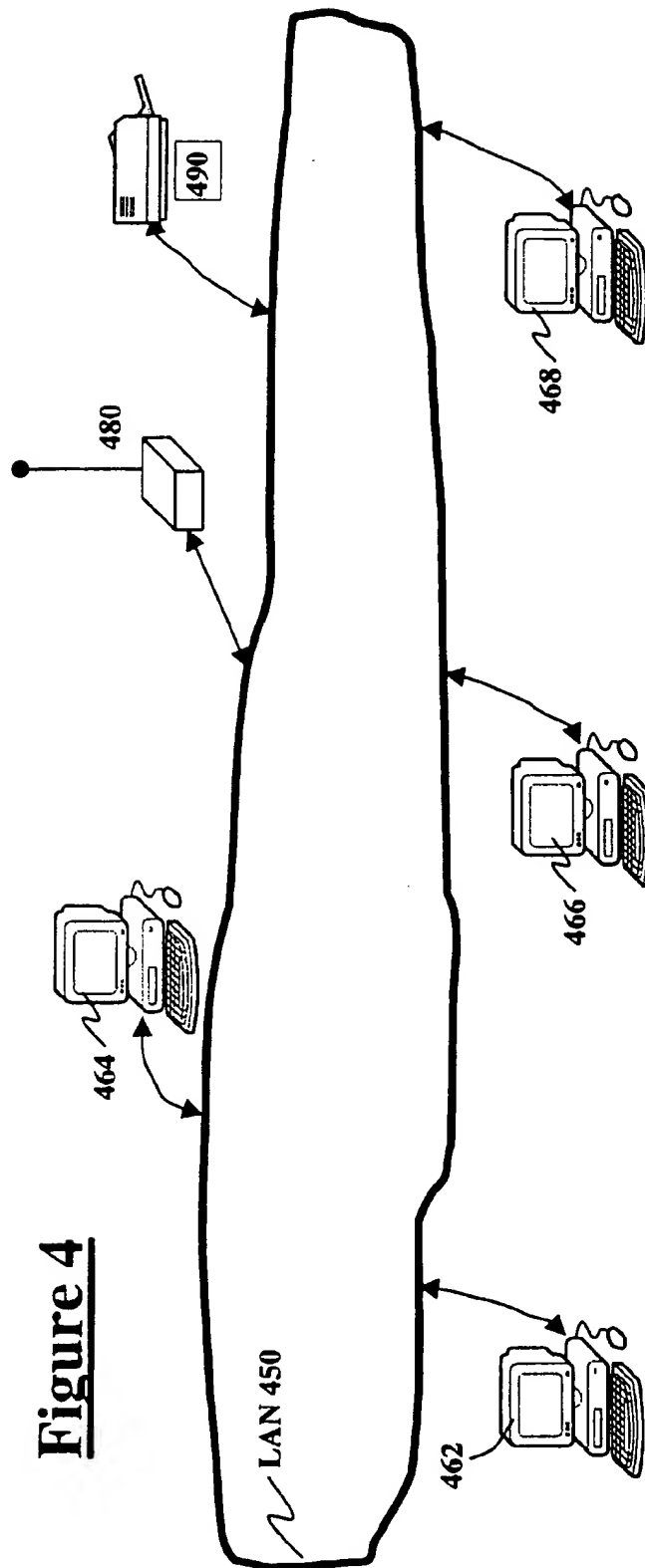
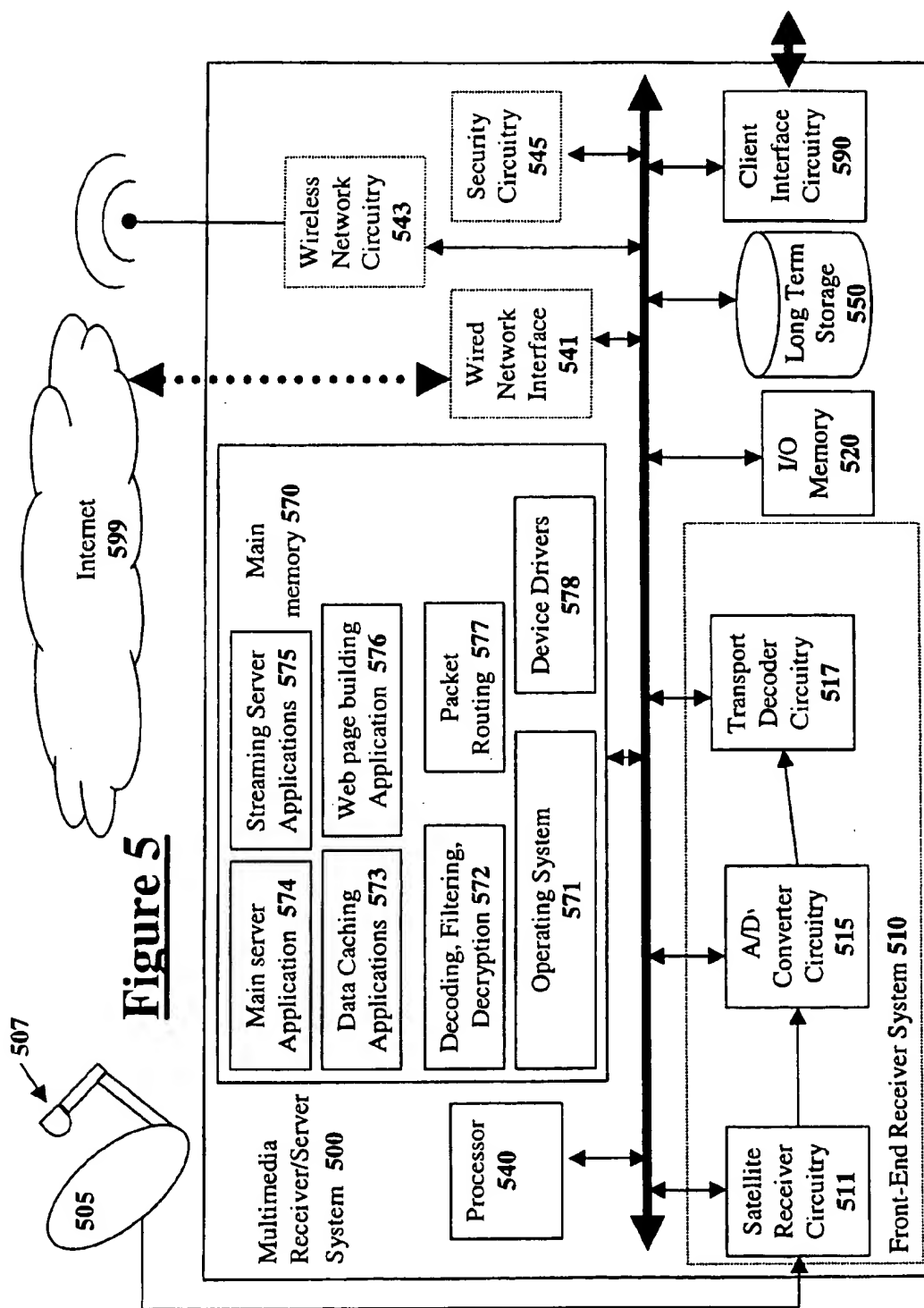
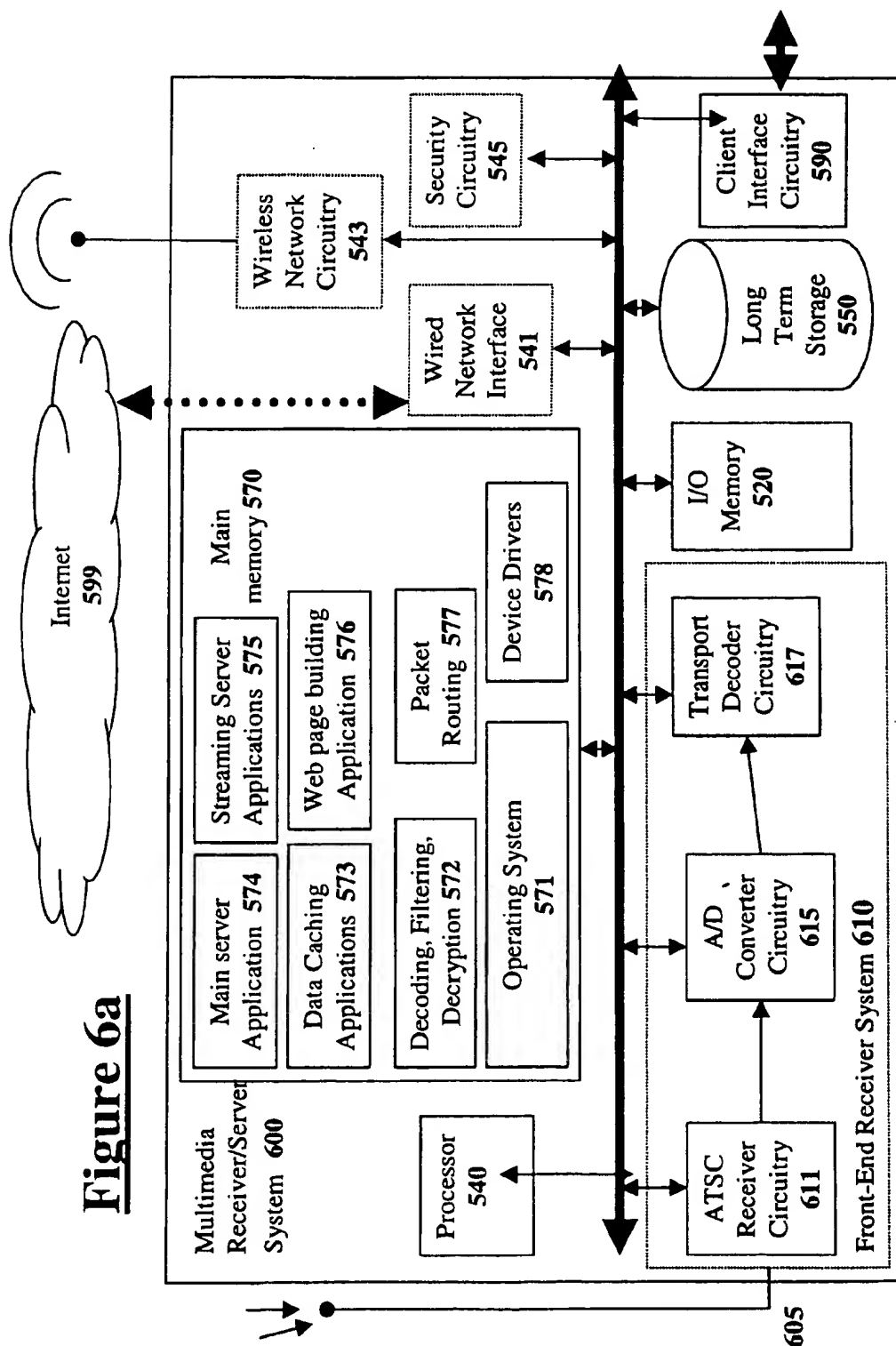


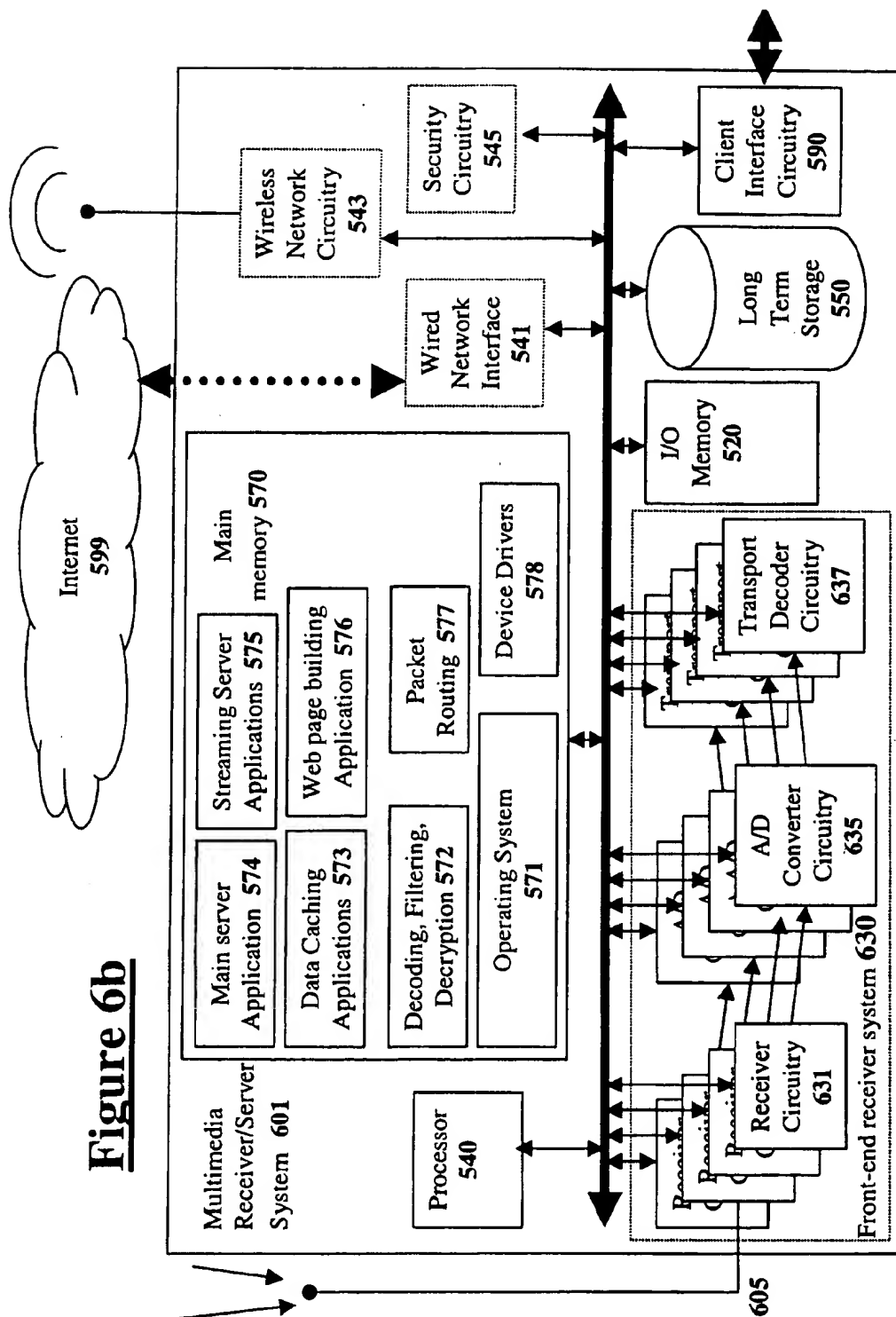
Figure 3c

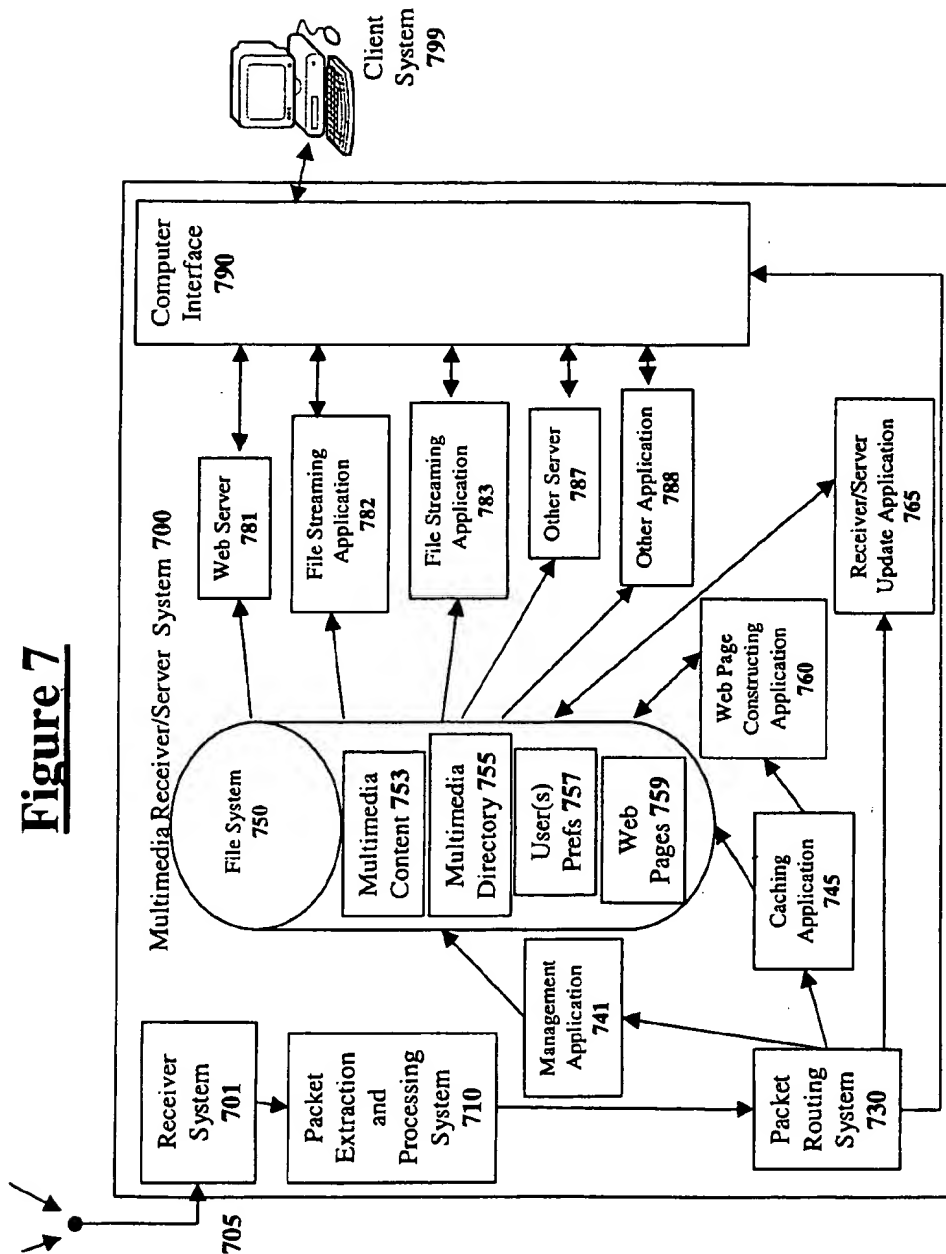
Figure 3d

**Figure 4**









Personal News On-Demand

News Headlines

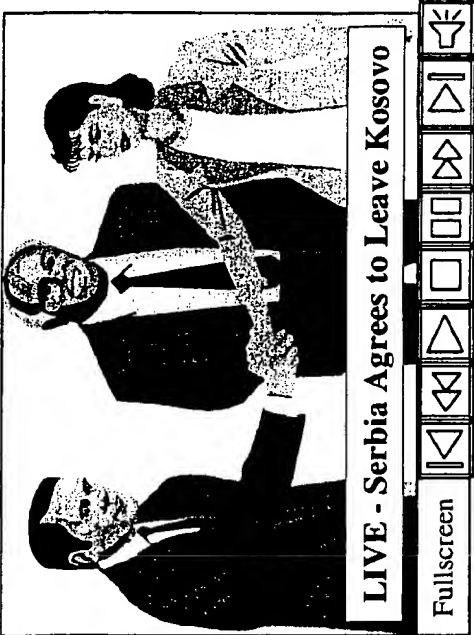
- Serbia Leaves Kosovo
- Manned Mars Mission Launch
- MN Vikings win Superbowl!
- Ice Storm Cripples East Coast
- Dow hits 20,000
- Bill Gates Donates 5 billion

Sports Headlines

- MN Vikings defeat 49ers
- NJ Devils trade star wing
- 2008 Olympics in Beijing
- Michael Jordan Coaches Lakers
- Mexico team joins MLB

Financial Headlines

- Dow hits 20,000
- Microsoft releases Office for Linux
- GM and Toyota Merge
- AOL and Geocast form joint venture
- Tech stocks gain



Science and Technology

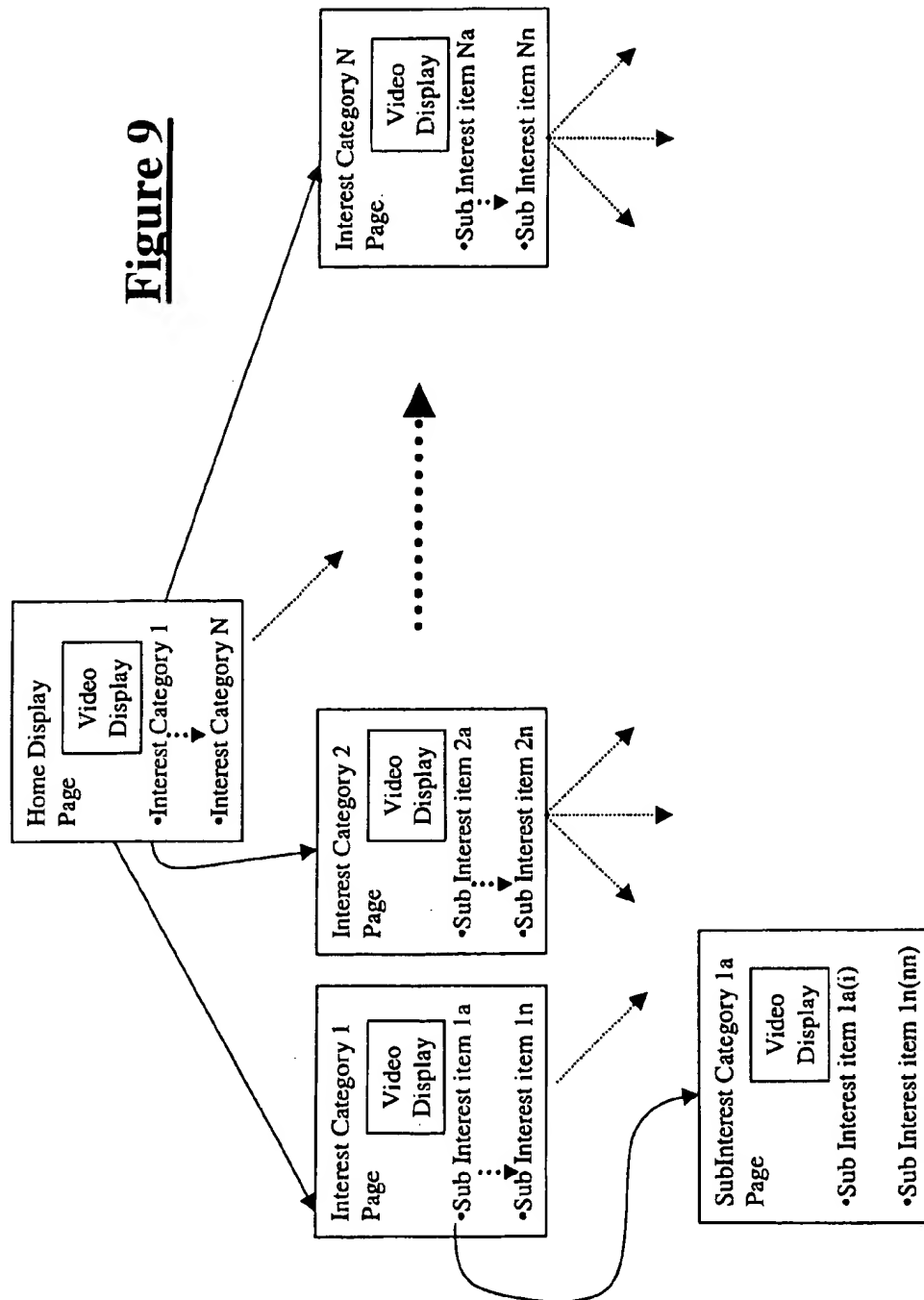
- Manned Mars Mission Launch
- International Mars Mission Crew
- Human Genome project complete
- Music ROM format released
- Solar Storm disrupts satellites
- Voyager's last words

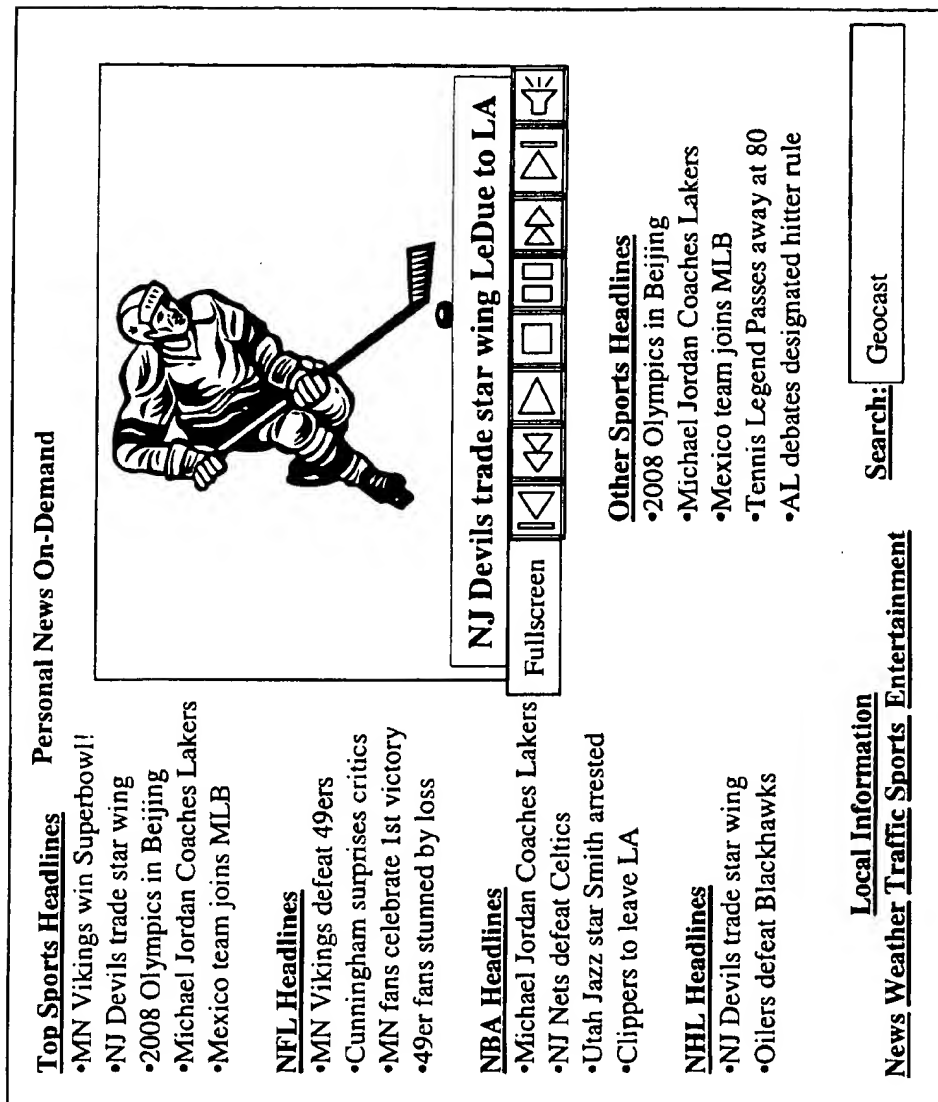
Local Information

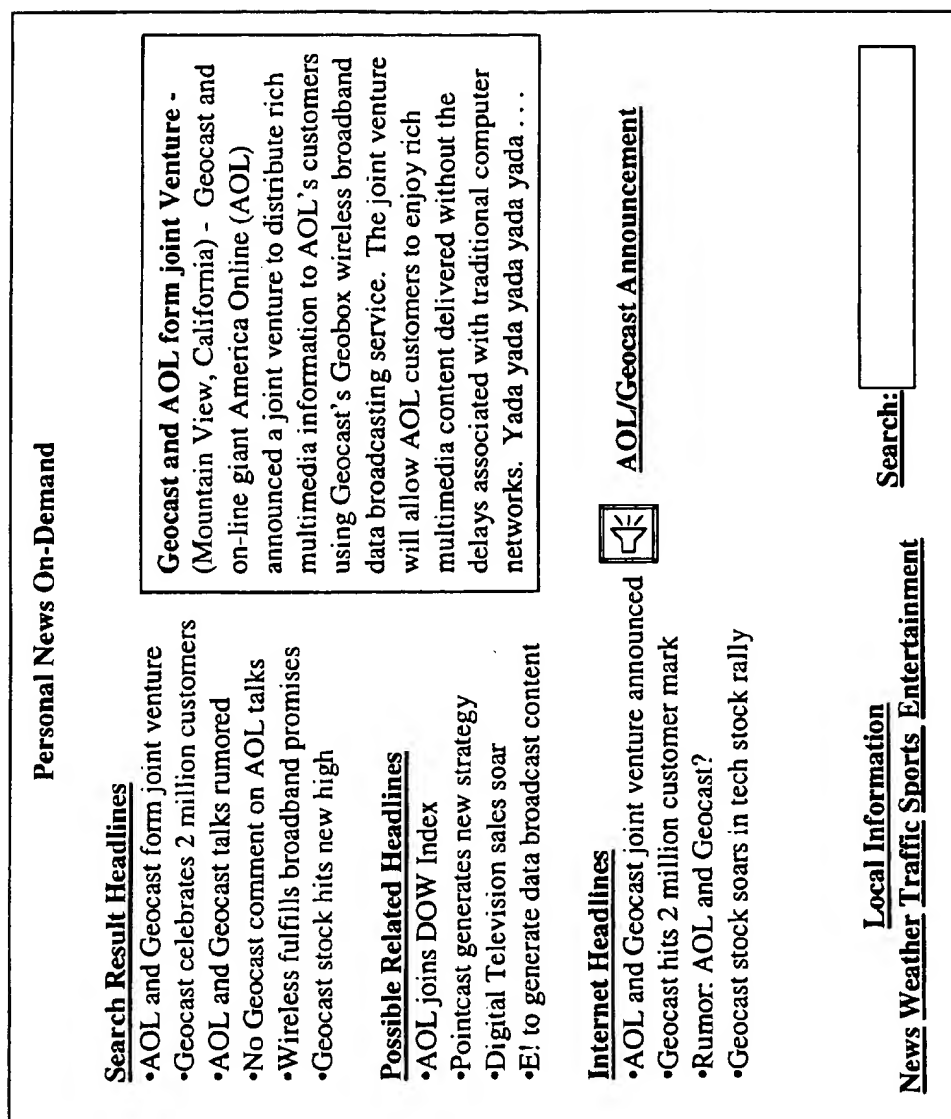
Search:

News **Weather** **Traffic** **Sports** **Entertainment**

Figure 8

Figure 9

**Figure 10**

**Figure 11**

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BROADBAND DATA BROADCASTING SERVICE

RELATED APPLICATIONS

This patent application is related to a patent application
entitled "Method and Apparatus for Broadcasting Data With
Access Control" having Ser. No. 09/293,079 filed on Apr.
16, 1999.

FIELD OF THE INVENTION

The present invention relates to the field of digital com-
munications. In particular the present invention discloses a
broadband digital broadcast system for broadcasting digital
information to a very large number of subscribers.

BACKGROUND OF THE INVENTION

The Internet has become a major source of news and
information for very large numbers of people. In particular,
millions of Internet users browse the World Wide Web
(WWW) to obtain HyperText Markup Language (HTML)
documents using the HyperText Transport Protocol (HTTP).
Many people now receive more news and information from
the Internet WWW sites than from traditional information
sources such as television. The WWW portion of the Internet
is an excellent medium for news and information since the
WWW Internet sites can provide information to users
on-demand. Specifically, Internet users can immediately
request the exact information they are interested in when
ever they wish from WWW Internet sites.

However, the Internet WWW system news information
does suffer from a number of deficiencies. One serious
problem is that the limited bandwidth of most Internet
connections severely limits the amount of information deliv-
ered. Most Internet users access the Internet through a
dial-up modem at speeds of 56 kps per second or less. With
such limited bandwidth, most Internet based WWW sites
only deliver text and static images. When video information
is delivered through 56K Internet connections, the video
information is compressed so heavily that only small low-
resolution video images are delivered at a low frame rate.

To improve upon the performance of the Internet, many
telecommunication providers are now offering high-
bandwidth connections for the "last mile" to an Internet
user's residence. Cable television providers are now offering
cable modem Internet service that use cable television
wiring to deliver broadband Internet service. Similarly,
telephone companies are rolling out Digital Subscriber Line
(DSL) services that provide broadband Internet service.
Although these broadband data connections provide addi-
tional bandwidth, such broadband connections only address
the "last mile" bandwidth problem associated with sending
rich multi-media information across the internet. Many other
problems will continue to exist.

One problem of delivering rich multi-media information
across the Internet is that there are no standard quality-of-
service guarantees for Internet Protocol data traffic. All
Internet Protocol traffic is delivered on a best effort basis
such that Internet Protocol packets are often dropped. Due
to the rapid uncontrolled growth of the Internet, many severe
Internet "traffic jams" have occurred at large Internet peering
point such as MAE-East and MAE-west. Thus, even if a user
has a broadband connection between his residence and his
Internet Service Provider (ISP), there is no guarantee that the
connection between the Internet Service Provider (ISP) and
a desired Internet media server will provide the bandwidth
necessary for a rich multimedia stream.

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Another problem with attempting to deliver rich multi-
media information across the Internet is the point-to-point
nature of Internet communication. Most Internet communi-
cation occurs in a unicast manner wherein a unique com-
munication connection is established between each infor-
mation server and each Internet client. Since each Internet
client requires its own connection, the bandwidth require-
ment for serving information grows proportionally with the
number of Internet clients being served. Furthermore, each
Internet client that requests service adds additional load to
the server systems that serve information. To serve rich
multimedia information to a large number of a client
systems, a large powerful server farm is required. It is
therefore quite expensive from the server end in both com-
munication costs and computer costs to serve large amounts
of rich multi-media information.

Due to the above-described problems associated with
Internet delivery of multimedia information, the Internet
will largely remain a text and static image based information
source. It would be desirable to provide a multimedia rich
information system that is similar to the Internet in terms of
on-demand access of interesting information but without the
bandwidth problems associated with the Internet network
system.

SUMMARY OF THE INVENTION

The present invention discloses a broadband data broad-
cast system that allows rich multimedia content to be
delivered to the computer and information appliance sys-
tems of limitless numbers of subscribers. The broadband
data broadcast system operates by multiplexing a plurality of
multimedia rich digital information streams together at a
centralized data broadcast center. The data broadcast center
then broadcasts the multiplexed digital information stream
on broadcast media such as satellite broadcasts, radio fre-
quency broadcasts, or television broadcasts. A large number
of receiver systems receive the broadcast signal and
demodulate the broadcast signal to retrieve the multiplexed
digital stream. The receiver system extracts a subset of
digital information streams that the particular receiver sys-
tem's owner has designated are of interest. The receiver
system may then output the interesting digital information
streams to a display system or caches the interesting digital
information stream for later access.

Other objects, features, and advantages of present inven-
tion will be apparent from the company drawings and from
the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

The objects, features, and advantages of the present
invention will be apparent to one skilled in the art, in view
of the following detailed description in which:

FIG. 1 illustrates an overview of a terrestrial data broad-
cast system.

FIG. 2a illustrates an overview of a multiple broadcaster
based terrestrial data broadcast system.

FIG. 2b illustrates a block diagram of a multiple broad-
caster based terrestrial data broadcast system.

FIG. 3a illustrates a multimedia receiver/server system
coupled to a personal computer system.

FIG. 3b illustrates a multimedia receiver/server system
coupled to a television set-top box system.

FIG. 3c illustrates a multimedia receiver/server system
coupled to a personal computer system that is also coupled
to the Internet.

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FIG. 3d illustrates a multimedia receiver/server system coupled to a television set-top box system that is also coupled to the Internet.

FIG. 4 illustrates an embodiment of a multimedia receiver/server system coupled to a computer network such that the multimedia receiver/server system serves multiple client systems.

FIG. 5 illustrates an embodiment of a multimedia receiver/server system that receives a data broadcast from a direct video broadcast satellite.

FIG. 6a illustrates an embodiment of a multimedia receiver/server system that receives a data broadcast on a digital television broadcaster signal.

FIG. 6b illustrates a block diagram of a multimedia receiver/server system that receives data broadcasts from multiple digital television broadcasters.

FIG. 7 illustrates a conceptual flow diagram of one possible software architecture for a multimedia receiver/server system.

FIG. 8 illustrates a first possible screen display from a multimedia web page served by a multimedia receiver/server system.

FIG. 9 illustrates a conceptual diagram of hierarchical multimedia information pages generated and stored by a multimedia receiver/server system.

FIG. 10 illustrates a second possible screen display generated by and served from a multimedia web page served by a multimedia receiver/server system.

FIG. 11 illustrates a third possible screen display generated by and served from a multimedia web page served by a multimedia receiver/server system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A method and apparatus for a directed data broadcast system is disclosed. In the following description, for purposes of explanation, specific nomenclature is set forth to provide a thorough understanding of the present invention. However, it will be apparent to one skilled in the art that these specific details are not required in order to practice the present invention. For example, the present invention has been described with reference to Internet multicasting. However, the same techniques can easily be applied to other types of data communication protocols.

Overview of a Data Broadcast System

FIG. 1 illustrates an overview of one embodiment of a data broadcast system that may incorporate the teachings of the present invention. Referring to FIG. 1, a data broadcast control center 150 receives digital information from a number of different data origination sources 110, 113, and 115.

For example, a first data origination source 110 transmits a digital information stream to a data broadcast facility 150 along a data communication channel 130. The data origination source 110 may be any entity that provides digital information for broadcast data over a data broadcast medium. One type of entity that may provide digital information for broadcast data over a data broadcast medium may be a broadcast news studio that creates audio and/or video news segments. The audio and/or video news segments may be digitized before or after transmission to the broadcast facility 150.

The broadcast control center 150 processes the incoming digital information stream from data origination source 110

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by adding addressing information, stream descriptor information, and error correction coding. Other stream processing operations may be performed such as encryption of the information streams. The broadcast control center 150 then multiplexes the received digital information stream from data origination source 110 with digital information streams from other sources such as data origination source 113 and data origination source 115.

After processing the individual digital information streams and multiplexing the individual digital information streams into a single broadcast stream, the broadcast facility 150 then modulates the multiplexed digital information stream onto a digital broadcast signal. The broadcast control center 150 then transmits the digital broadcast signal on a broadcast distribution medium. In the particular embodiment illustrated in FIG. 1, a terrestrial wireless broadcast system is used to broadcast the digital broadcast signal to a large number of receiving sites. However, it should be noted that many types of broadcast media can be used such as digital broadcast television signals, cable television signals, radio frequency broadcasts, direct video broadcast satellite signals, or any other suitable broadcast medium.

At each data broadcast receiver site is a data broadcast receiver system such as receiver 181 constructed to receive the digital broadcast signal. The receiver system 181 demodulates the digital broadcast signal to retrieve the multiplexed digital information stream. The receiver system 181 then examines the address portion of data packets and/or stream descriptor portions of each digital information stream to determine if the receiver system 181 is interested in a particular digital information stream. The receiver system 181 may be interested in a particular digital information stream if that digital information stream matches a set of preprogrammed interest parameters as defined by the receiver systems owner. The receiver system 181 may cache the matching digital information streams and/or directly output the matching digital information streams to one or more local client systems at the receiver system's site.

In one embodiment, the receiver system may distribute the output digital information streams in multicast Internet Protocol (IP) form on a local area network (LAN) if requested by any multicast subscribers on the LAN. For example, receiver system 184 receives and decodes the multiplexed broadcast signal. The receiver system 184 then rebroadcasts a subset of the received data onto an internal local area network (LAN) 130 such that the information stream is made available to client systems 131, 132, and 133. Furthermore, the receiver system 184 may cache the received digital information internally such that the information may be retrieved by the client systems at a later time. Terrestrial Digital Television Data Broadcast Distribution

One broadcast medium that may be used to broadcast digital information is the terrestrial digital television infrastructure that is currently being built out. In a terrestrial digital television based transmission system, the processed multiplexed information stream is broadcast on a digital television transmission system using the MPEG-2 transport protocol.

The cost of building and maintaining a terrestrial digital television transmission system is very high. It would therefore be very expensive to build a terrestrial digital television transmission system just for data broadcasting. Instead, it would be desirable to share terrestrial digital television broadcast transmission capability with a terrestrial digital television broadcaster. Thus, the present invention introduces an embodiment that uses extra broadcast capacity on terrestrial digital television transmission systems to provide

an inexpensive data broadcast transmission system. In a preferred embodiment, extra digital broadcast transmission capacity from more than one digital television broadcaster may be used to provide broadband data broadcasting.

FIG. 2a illustrates a data broadcasting embodiment wherein the data broadcast control center 150 delivers MPEG-2 transport protocol encoded information streams to one or more terrestrial digital television broadcast centers 251, 252, and 253. The terrestrial digital television broadcast centers (251, 252, and 253) merge the received MPEG-2 transport protocol encoded information streams into their ATSC (Advanced Television Standards Committee) digital television signals. The terrestrial digital television broadcast centers 251, 252, and 253 then broadcast the merged signal to all the receiver systems through their digital television transmission systems 261, 262, and 263. The receiver systems (181, 182, 183 . . .) receive the ATSC digital television signals and extract the desired digital information streams from the MPEG-2 transport stream. In such a multi-broadcaster embodiment, each receiver system (181, 182, 183 . . .) should have more than one receiver circuit such that multiple digital television broadcast centers (251, 252, and 253) can be monitored simultaneously.

FIG. 2b illustrates a block diagram of the embodiment in FIG. 1. As illustrated in the block diagram of FIG. 2b, a multiplexing unit 257 must multiplex all of the processed digital information streams into a number of outgoing digital information streams equal to the number of broadcast stations being used. For example, in the example embodiment of FIGS. 2a and 2b, the multiplexing unit 257 must distribute the outgoing digital information stream to the three digital television broadcast stations 251, 252, and 253.

The individual digital television broadcast stations 251, 252, and 253 multiplex the data broadcast information in with their local digital television signal. The individual digital television broadcast stations 251, 252, and 253 may also multiplex in additional locally generated data broadcast content. For example, digital television broadcast stations 251 may create additional data broadcast formatted content with local advertisers and local news teams. These local content digital information streams provide additional data broadcast content to the data broadcast digital information streams. All of the receiver systems (181, 182, 183 . . .) will receive the data broadcast signals from all the participating television broadcaster stations (251, 252, and 253).

Additional detailed information on a data broadcasting infrastructure that can use the teachings of the present invention is available in the co-pending patent application entitled "Method and Apparatus for Broadcasting Data With Access Control" having Ser. No. 09/293,079 filed on Apr. 16, 1999 and hereby incorporated by reference.

Data Broadcast Receiver Systems

The receiver systems of the present invention receive data systems broadcast information and present that information to users of the receiver system. In one embodiment, the data broadcast receiver systems receive the data broadcast streams and present that information to other client systems that display the received digital information. Such an embodiment is referred to as a wireless multimedia receiver/server device since multimedia information is received over a wireless medium and served to other client systems.

FIG. 3a illustrates a first example usage of a wireless multimedia receiver/server device. In the embodiment of FIG. 3a, a personal computer system 310 is coupled directly to a wireless multimedia receiver/server device 330. A number of different interface ports on computer system 310

may be used for such a connection. For example, a parallel data port, a Small Computer System Interface (SCSI), an Ethernet interface (using a cross-over cable), a FireWire™ Bus (IEEE.1394), or a Universal Serial Bus (USB) interface may be used to couple computer system 310 to wireless multimedia receiver/server device 330. It is desirable to select the available computer interface having the highest data rate in order to efficiently deliver rich multimedia content from the multimedia receiver/server device 330 to the computer system 310.

The wireless multimedia receiver/server device is not limited to usage by personal computer systems. FIG. 3b illustrates an example usage wherein a television set-top box 320 is coupled to a wireless multimedia receiver/server device 330. The television set-top box 320 may operate using standard Internet data communication protocols such as HyperText Transport Protocol (HTTP).

The wireless multimedia receiver/server device 330 may be used alone as illustrated in FIGS. 3a and 3b or in conjunction with a wired network connection. FIGS. 3c and 3d illustrate an application of a wireless multimedia receiver/server device 330 wherein the wireless multimedia receiver/server device 330 acts as an intermediary for an Internet connection. In such an embodiment, the wireless multimedia receiver/server device 330 may act as a proxy server for the Internet. In such an arrangement, the wireless multimedia receiver/server device 330 may provide many additional services such as local domain name service (DNS), web page caching, and email service. In a web page caching wireless multimedia receiver/server device 330, the broadcast control center may broadcast versions of very popular web pages to the wireless multimedia receiver/server devices such that very popular web pages are immediately available.

The receiver systems can be used to provide service to multiple client systems at a receiver site. FIG. 4 illustrates a wireless multimedia receiver/server device 480 is coupled to a local area network (LAN) 450. The local area network (LAN) 450 may be constructed using standard Ethernet technology, Token Ring technology, homerun™ home LAN technology, or any other existing or newly created computer network technology. In a computer network based embodiment, the wireless multimedia receiver/server device 480 may serve several client systems coupled to the local area network (LAN) 450. For example, in FIG. 4 the multimedia receiver/server device 480 may serve multimedia information to client computer systems 462, 464, 466, and 468.

Data Broadcast Receiver/Server Hardware

FIG. 5 illustrates one embodiment of a multimedia receiver/server device 500. The multimedia receiver/server device 500 receives an encoded data stream through a receiver front-end receiver system 510. The receiver front-end system 510 includes a signal reception system 505 for receiving a digital broadcast signal and accompanying receiver circuitry for demodulating digital broadcast signal received on the signal reception system 505. The signal reception system 505 may be a Ku band satellite antenna, a terrestrial broadcast digital television antenna, a connection to a cable television based digital signal distribution system, or any other appropriate system for receiving broadcast signals.

A Digital Video Broadcast Satellite Based Receiver Front-End

The multimedia receiver/server device 500 of FIG. 5 illustrates a satellite based digital video broadcast based

receiver front-end system 510. In the digital video Broadcast based receiver front-end system 510, the signal reception system 505 may comprise a Ku Band satellite antenna system.

The Ku Band satellite signal reception system 505 includes a low-noise block converter (LNB) 507 that delivers a frequency converted signal an appropriate satellite band receiver circuitry 511. The satellite receiver circuitry 511 filters and amplifies the frequency range of the desired satellite signal. The satellite receiver circuitry 511 multiplies the filtered signal using a local oscillator to recover an in-phase (I) and quadrature (Q) version of the broadcast signal.

The satellite receiver circuitry 511 passes the in-phase (I) and quadrature (Q) signals to an analog to digital (A/D) converter 515. The analog to digital (A/D) converter 515 digitizes the in-phase (I) and quadrature (Q) signals and passes the digitized signal information to transport decoder circuitry 517.

The transport decoder circuitry 517 recovers the transmitted digital bit stream from the digitized in-phase (I) and quadrature (Q) signals. In one Ku band direct video broadcast satellite embodiment, the transport decoder circuitry 517 may include a demodulator integrated circuit such as the OTI-8511 integrated circuit from Oak Technology of Sunnyvale, Calif. In such a DVB satellite based system, the OTI-8511 integrated circuit demodulates the in-phase (I) and quadrature (Q) signals to recover an MPEG-2 transport stream. The MPEG-2 transport stream is defined by the ISO standard in the document ISO/IEC 13818-1 titled "Information technology—Generic coding of moving pictures and associated audio information: Systems." Control circuitry in the transport decoder circuitry 517 may copy the MPEG-2 transport stream into an I/O memory system 520.

A Terrestrial Digital Television Based Receiver Front-End

FIG. 6a illustrates a multimedia receiver/server device 600 that has a different receiver front-end receiver system. Specifically, FIG. 6a illustrates a multimedia receiver/server device 600 with a terrestrial digital television based receiver front-end system 610. In particular, a terrestrial digital television based upon the American Television Standards Committee (ATSC) is illustrated. In the ATSC digital television based receiver front-end system 610, the signal reception system 605 comprises an antenna system suitable for receiving ATSC digital television signals.

The ATSC digital television signals are then processed by an ATSC digital television receiver circuit 611. As in the satellite embodiment of FIG. 5, the receiver circuit 611 is used to recover an MPEG-2 transport stream. The MPEG-2 transport stream is then decoded by transport decoder circuitry 617. Since the same transport coding is used as disclosed in the preceding receiver system, the same MPEG-2 transport stream decoder may be used to decode the signal to retrieve the MPEG-2 transport stream. The output MPEG-2 transport stream may then be placed into the I/O memory system 520.

As noted in the embodiments of FIG. 5 and FIG. 6a, multiple different types of receiver systems can be constructed that used different frontend receiver systems. In this manner, slightly modified receiver systems can be built for each target market in order to take advantage of the best broadcast medium for that market. Specifically, ATSC terrestrial digital television frontend receiver systems, direct video broadcast satellite front-end receiver systems, and digital cable television front-end receiver systems can be built for ATSC terrestrial digital television markets, direct video broadcast markets, and digital cable television

markets, respectively. With those three different types receiver systems, the same MPEG-2 transport systems is always used such that the same MPEG-2 transport signal can be used for all the different types of markets.

A Multiple Tuner Terrestrial Digital Television Receiver Front-End

As illustrated in FIG. 2a, it may be desirable to aggregate the extra broadcast bandwidth available from a number of digital television broadcasters within a particular terrestrial broadcast television market. With such an arrangement as depicted in FIG. 2a, the receiver systems should be able to receive all of the broadcast data signals. FIG. 6b illustrates a multimedia receiver/server device 600 that includes multiple instances of the receiver front-end receiver system. Specifically, FIG. 6b illustrates a multimedia receiver/server device 600 with multiple instances of the receiver circuitry 611, the Analog to Digital circuitry 615, and the transport decoder circuitry 617. In this manner, multiple data broadcasts from multiple digital television broadcasters (251, 252, and 253) can be simultaneously received. With such a multiple receiver configuration, the aggregated bandwidth may exceed multiple megabytes per second.

Receiver System Digital Information Stream Processing

Referring back to FIG. 5, once the multiplexed digital stream is copied into the I/O memory system 520, the processor 540 of the receiver/server 500 performs additional processing of the digital stream. The processor 540 is part of a typical computer system arrangement that includes memory (memory 570 and I/O memory 520), long term storage 550, input/output devices (590, 541, 543, etc.), and a central processing unit (processor 540).

The processor 540 operates under the control of programs in the main memory 570. To share the computing resources of the digital receiver system 500, the processor 540 executes an operating system 571. The operating system 571 provides standard operating system features such as input/output abstraction, multitask scheduling, and memory management. The operating system allows the application software to easily access and use the resources of the computer system. In one embodiment of the present invention, the operation system 571 comprises a version of the Berkeley Standard Distribution (BSD) of the UNIX operating system. However, other operating systems can be used.

Data Broadcast Receiver/Server Software

As illustrated in FIG. 5, the multimedia receiver/server 500 may execute several application programs concurrently under the control of an operating system 571 to provide data broadcasting services to a user. The software of one embodiment of a multimedia receiver/server system will be disclosed with reference to FIGS. 5 and 7. However, many different multimedia receiver/server software architectures may be created.

Referring to FIG. 7, a conceptual software architecture diagram of a multimedia receiver/server 700 is illustrated. The software architecture has been designed to process data broadcast information received through a receiver system 701 and present that data broadcast information to a user at a client system 799. A first step that is performed is parsing of the incoming digital information stream.

Packet Extraction and Processing

Referring the conceptual diagram of FIG. 7, a packet extraction and processing system 710 examines the multiplexed digital information stream received by the receiver system 701. The packet extraction and processing system 710 extracts network packets that may be of interest to the multimedia receiver/server system 700. Specifically, the

packet processing system 710 identifies and extracts packets that are specifically addressed to the multimedia receiver/server system 700 and packets that have specific defined characteristics. In a preferred embodiment, the data packets are Internet Protocol (IP) packets.

Referring back to FIG. 5, the packet processing is performed by one or more decoding, filtering, and decrypting applications 572. In one embodiment, these applications extract IP packets from MPEG-2 transport frames. The IP packet extraction may include such steps as forward error correction, decryption, and packet reassembly. Normally, not all of the packets in the multiplexed digital information stream will be extracted since many packets may be encrypted in a manner that cannot be decrypted by this unit, addressed to other entities, or otherwise inappropriate.

Packet Routing

Referring again to FIG. 7, the extracted packets are passed to a packet routing system 730. The packet routing system 730 routes the received packets appropriate destinations. For example, certain system update packets may be addressed for delivery to a receiver/server update application 765. The receiver/server update application 765 may thereby receive information that allows automatic software updates to be performed on the multimedia receiver/server system 700. Packets may also be routed to a management application 741 that manages the operation of the multimedia receiver/server system 700. For example, encryption keys that may be used to decrypt certain digital information streams may be delivered to the management application 741 such that the management application 741 may receive encryption keys and other control parameters.

The packet routing system 730 may route other data packets to one or more client systems coupled to the multimedia receiver/server system 700 through computer interface 790. Thus, it can be seen from FIG. 7 that the multimedia receiver/server system 700 may forward data packets received from the data broadcast signal directly to client systems coupled to the multimedia receiver/server system 700. In such operations, the multimedia receiver/server system 700 acts as a packet router to deliver packets broadcast over a broadcast medium. One very useful application for this particular feature is using the multimedia receiver/server system 700 as a multicast router that can deliver multicast packets to any client or network coupled to the multimedia receiver/server system 700. For example, a stock ticker stream may be broadcast as a live multicast IP stream such that a stock trading application on client system 799 may directly receive and use real-time stock trading information.

Referring to FIG. 5, the packet routing may be performed by a packet routing application 577. The routing application uses the services provided by the operating system 571 and device drivers 578 to deliver packets to the proper destinations.

Information Caching

As seen in the preceding section, the multimedia receiver/server system 700 can be used to immediately route packets received from the data broadcast signal. However, the multimedia receiver/server system 700 can also be used to provide very useful data services by locally caching information. Referring to FIG. 7, one or more caching applications 745 (data caching application 573 in FIG. 5) receives data packets from the packet routing system 730 and caches information from those packets into a file system 750.

In one embodiment, the caching application 745 may request to receive packets addressed to one or more designated multicast addresses that carries multimedia informa-

tion and accompanying descriptors. The caching application 745 selectively captures multimedia information and stores that multimedia content information 753 in a file system 750. The caching application 745 may create multimedia information directory 755 such that the cached multimedia information may be quickly searched and accessed. The multimedia information may consist of anything that can be expressed in digital form including audio, video, text, web pages, and computer programs.

In one embodiment, each multimedia information stream is preceded by a multimedia descriptor. The multimedia descriptor describes the details of the upcoming multimedia stream. The caching application 745 can use the multimedia descriptor to determine if the upcoming multimedia stream should be cached or not. For example, in one embodiment the user defines a set of categories that the user finds interesting. These categories are stored in users preferences file 757. Then, the caching application 745 uses the multimedia descriptor information in conjunction with the set of user preferences 757 to select multimedia streams that contain news or information related to the defined set of user interests. The caching application 745 can use the multimedia descriptor to help build the multimedia directory 755.

The following list provides some of the information that may be provided in a multimedia descriptor:

Title: A title for the multimedia stream

Full Headline: A news headline that can be used to describe the multimedia stream in a web page.

Origination date/time: The time the stream was broadcast.

Suggested expiration: A suggested expiration time for the stream. A multimedia receiver/server may use the expiration time to determine when the stream should be deleted from the multimedia content cache 753.

Source: A source of the multimedia stream (Reuters, CNN, Associated Press, United Press International, etc.)

Multimedia Stream Format: Information that describes the protocol and format of the multimedia information stream.

Accompanying multimedia stream(s): Other related multimedia streams.

SDP descriptor: A session description protocol (SDP) as defined by the IETF RFC 2327 for the multimedia stream.

Importance: A relative importance value assigned to the multimedia stream. The Importance value may be used when created user displays such that highly important stories are listed first.

Categorization code: A detailed categorization value that defines the subject matter of the multimedia stream. The categorization code may be hierarchical. For example, a multimedia video clip about the Minnesota Vikings winning the Superbowl may be categorized as Sports/NFL/MN_Vikings

Ticker Symbols: If the multimedia story is related to one or more publicly traded corporations, the ticker symbols of those corporations should be listed here. This field can be used to identify stories about a public corporation when performing investment research.

Searching keywords: A set of keywords that are associated with the multimedia stream. The searching keywords can be used to locate relevant multimedia streams when searching the multimedia content.

News Item HTML: A preformatted web page that can be used to introduce or accompany a multimedia stream.

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News Item Text: Text that describes the multimedia stream.

As can be seen from the multimedia descriptor description, the caching application 745 is provided with a large number of fields that can be used to select interesting multimedia streams. Additional fields may be used to provide additional information about the multimedia streams.

The caching application 745 may also handle cache clean up. Specifically, old and outdated information should be removed from the file system 750 to conserve resources. The caching application 745 may use a number of different methods of selecting information to remove. One simple method of performing cache clean up is to remove cached items after their suggested expiration time has elapsed.

Information Serving

The multimedia receiver/server system 700 may present the cached multimedia information in a number of different ways. However, one of the most popular current methods of presenting information is in the form of World Wide Web (WWW) pages formatted in HyperText Markup Language (HTML) or extensible Markup Language (XML). One embodiment of the multimedia receiver/server system 700 uses a web page constructing application 760 to create WWW pages 759 that may be presented to client systems. (The web page constructing application is listed as web page building applications 576 in FIG. 5.)

The web page constructing application 760 may continually examine the contents of the multimedia directory 755 and the multimedia content 753 to locate information to be incorporated into web pages. In one embodiment, the caching application 745 directly informs the web page constructing application 760 about the multimedia streams that will be cached. In this manner, the web page constructing application 760 can incorporate the newly cached information into the web pages. Furthermore, the web page constructing application 760 can incorporate "live" information that is currently being received by referring to a multicast stream that contains the live stream. Similarly, the caching application 745 should inform the web page constructing application 760 about multimedia information being removed from the file system 750 such that the web page constructing application 760 can remove references to deleted information.

The web page constructing application 760 should create web pages in accordance with the user's particular preferences. Specifically, the web page constructing application 760 refers to the user preferences file 757 to create a custom multimedia enhanced web page that specifically contains information according to the user's preferences. In a multiple client environment, the web page constructing application 760 may create a different customized web page for each user that uses the multimedia receiver/server system 700.

A web server application 781 serves the created web pages 759 to client systems that request the web pages 759. (The web server application is listed as main server application 574 on FIG. 5.) Due to the caching of rich multimedia information, the web server 781 may be aided by one or more file streaming applications 782 and 783. The file streaming applications 782 and 783 stream rich multimedia information such as videos and audio that may be incorporated into the customized web pages 759. Furthermore, the web pages may incorporate "live" streaming information that is delivered straight from the packet routing system 730. In this manner, video from live events can be incorporated directly into web pages.

Other methods of serving information besides using the World Wide Web protocols and formats may also be pro-

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vided. For example, server 787 may provide raw file information to client systems the well-known Network File System (NFS). Server 787 could also be a File Transport Protocol (FTP) server. Other server applications that implement other protocols can also be implemented.

A Data Broadcast News Application

To illustrate one type of service that may be provided by the data broadcast system of the present invention, an example of a data broadcast news application is disclosed. Referring to FIG. 7, a user at a client system creates a set of preferences that describe the user's interests. The user preferences may be obtained by presenting a set of forms to the user with web server 781. The forms can be processed by Common Gateway Interface (CGI) scripts that store the user's preferences into user preferences file 757. For example, a user may specify that he is interested in top news stories, sports information, financial information, and science & technology information.

Using the user interests in the user preferences file 757, the data caching application 745 begins collecting multimedia streams and multimedia descriptors broadcast over the data broadcast system. The caching application 745 creates a multimedia directory 755 using multimedia descriptor information. The caching application 745 may directly inform the web page constructing application 760 about the information streams that are being cached.

The web page constructing application 760 then uses the user preference information 757 along with multimedia descriptor information from the caching application 745 or from the multimedia directory 755 to create a customized multimedia enhanced web page for the user. FIG. 8 illustrates one possible example of a customized new web page created for the example user that is interested in top news stories, sports information, financial information, and science & technology information.

As depicted in FIG. 8, the top news stories related to the user's interests are displayed in headline form. Furthermore, a multimedia video clip stream related to the most important news story within the user's interests is playing within a window of the web page display. The user can control the video clip using common VideoCassette Recorder (VCR) type controls such as play, stop, fast-forward, reverse, and mute. A video window as depicted in FIG. 8 may be implemented using a RealVideo viewer from RealNetworks of Seattle, Wash. or a NetShow viewer from Microsoft Corporation of Redmond, Wash. If the user is very interested in the story playing within the selected video clip, the user can expand the video to fill the full screen of the client system. The user may also retrieve other information related to the displayed video clip.

If the user is not interested in the video clip currently being displayed, the user can select one of the other headlines to bring up information on that story. The information may consist of a video clip, an audio clip, a web page, a text story, or any other digital information presentation.

The news web pages of the present invention can be created in typical hierarchical organization that is familiar to most computer users. FIG. 9 illustrates a conceptual diagram of a set of hierarchical web pages that have been created using the user's preferences and the available multimedia information. Thus, referring back to FIG. 8, if the user is not interested in the video clip currently being displayed or any of the current headlines, the user can select one of the different headline categories. The web server will then present a web page with specific category information.

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In one embodiment, the user can select one of the headlines in a story to bring up a web page with additional stories in that category and detailed information about the selected story. For example, if the user selects the "NJ Devils trade Star Wing" headline the Sports news web page illustrated in FIG. 10 may be presented. As illustrated in FIG. 10, a video clip of the hockey player trade is displayed. Furthermore, the web page displays sports related news as a list of sports headlines. In the example of FIG. 10, the sports category sub-categories of NFL Headlines, NBA headlines, NHL headlines, and Other Sports Headlines are displayed.

Searching

The multimedia receiver/server system 700 can be used to provide custom web pages created in response to a user's query. For example, FIG. 10 illustrates a search term input box wherein a user may enter one or more search terms. More detailed searching can be performed by selecting the "search" prompt. As illustrated in FIG. 10, a user has requested a search to be performed using the term "Geocast." Referring back to FIG. 7, the web page construction application 760 uses the entered search term to search the multimedia directory 755. Furthermore, the web page construction application 760 may examine descriptor information for multimedia streams currently being received such that "live" content may be incorporated.

Using the located information that is related to the search terms, the web page construction application 760 dynamically creates a web page that may be presented to the user. FIG. 11 illustrates an example of a web page that may be created after searching the multimedia directory 755 with the search term "Geocast". As illustrated in FIG. 11, the dynamically generated web page contains a list of headlines from stories or multimedia streams related to the search term. The detailed information from most important story may be presented in a separate window as illustrated in FIG. 11. In this example, the multimedia information is a short text story with an accompanying audio stream of an official company announcement. Furthermore, the web page construction application 760 may include information from stories or multimedia information that may be related to the search terms.

In one embodiment wherein the multimedia receiver/server system 700 is coupled to the Internet, the web page construction application 760 may also include information retrieved from the Internet. Thus, the multimedia receiver/server system 700 can be used to merge multimedia information received over the data broadcast network with information retrieved from the Internet into a single display.

A Data Broadcasting Service

As disclosed, the present invention teaches methods and apparatus for implementing a broadband data broadcast system. The broadband data broadcast system allows rich multimedia information to be delivered to end-users that have narrowband or even no connection to the Internet. The broadband data broadcast system can be used to create a broadband data broadcast information service.

In one embodiment, the broadband data broadcast information service operates by selling multimedia receiver/server devices to consumers that desire service. The consumers connect their multimedia receiver/server devices to appropriate client systems such as personal computers, television set-top boxes, and home networks.

In one embodiment, a stand-alone multimedia receiver/display device may be sold such that users can use the service without having to have any other client system. Such an embodiment would be similar to the embodiment of FIG. 5 except that the client interface circuitry 590 would be replaced by a display device that is capable of displaying information and the software would include client software for displaying information on the display device.

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The broadband data broadcast service could be subscription based, advertiser supported, or a combination of paid subscription content and advertiser supported content. In a preferred embodiment, a significant amount of information is broadcast without a subscription requirement but is accompanied by advertising multimedia information that is displayed concurrently or intermittently. For example, an advertisement window can be added to the screen displays of FIGS. 8, 10, and 11. Due to the broadband nature of the disclosed data broadcasting system, the advertisement window can include video and audio information. Thus, the broadband data broadcast system of the present invention permits advertisers to provide a rich multimedia message to users.

The advertisements can be accompanied by additional detailed information and programs stored locally on the file system 750. Thus, when a user is interested in a particular advertisement, the user can obtain that additional information or run programs associated with the advertisement. For example, an advertisement for a catalog based clothing merchant can be linked to a full version of the merchant's clothing catalog stored locally on the multimedia receiver/server device 700. Advertisers that desire to have large commercial documents such as product catalogs stored within the cache of the multimedia receiver/server systems could be charged a fee for such a privilege. The fee may be related to the amount of time that the commercial documents will be cached in the multimedia receiver/server device 700.

The user can browse the locally stored clothing catalog and select items for purchase. If the user has an Internet connection, the user can fill out an order form to order an item from the catalog. The broadband data broadcast capability of the present invention allows the catalog to include far more detailed information than normally presented on an Internet web page. Furthermore, the caching capability of the system allows all the catalog information to be stored locally for immediate and instantaneous access. Thus, it can be seen that the data broadcast service of the present invention provides the rich multimedia experience of radio and television along with the interactive browsing features of the Internet.

As depicted in FIGS. 3a and 3b, not all users of the multimedia receiver/server system of the present invention will have an Internet "back channel." Thus, a user without an Internet connection that browses a product catalog contained within the multimedia receiver/server system cannot initiate an Internet based ecommerce transaction. For such users, FIG. 5 illustrates one embodiment of the present invention that includes wireless network circuitry 543 for providing a wireless back channel. For example, a contract may be made with a cellular telephone provider to obtain access to the Short Messaging Service (SMS) portion of their cellular telephone network. The wireless network circuitry 543 may provide significant bandwidth to enable complex transactions such as online gaming, however the wireless network circuitry 543 need only provide a narrowband connection for ecommerce applications such as purchase orders.

In addition to advertiser supported content, a number of subscription fee based premium services can be offered using the directed broadcast system of the present invention. For example, a special financial information subscription package may be offered that contains real-time stock quotes and in-depth financial news. Such subscription fee based premium data broadcast services would be protected by encrypting the digital information streams containing the premium content. To prevent piracy, the encryption system can be aided with the use of tamper-proof encryption circuitry 545 as depicted in FIG. 5. The tamper-proof encryption circuitry 545 contains private keys that cannot be

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accessed. Attempts to access the secret encryption keys within the encryption circuitry 545 will destroy the encryption circuitry 545. In one embodiment, the secure encryption module 870 comprises an iButton from Dallas Semiconductor of Dallas, Tex.

The foregoing has described a directed data broadcast system. It is contemplated that changes and modifications may be made by one of ordinary skill in the art, to the materials and arrangements of elements of the present invention without departing from the scope of the invention.

We claim:

1. A multimedia receiver apparatus, said apparatus comprising:

a first wireless receiver circuit, said first wireless receiver circuit demodulating a first wireless encoded digital multimedia signal having a first plurality of multimedia streams;

a second wireless receiver circuit, said second wireless receiver circuit demodulating a second wireless encoded digital multimedia signal having a second plurality of multimedia streams;

a processor, said processor controlling said first wireless receiver circuit and said second wireless receiver circuit, said processor selecting and extracting a subset of multimedia streams from said first plurality of multimedia streams and second plurality of multimedia streams;

a long term storage device, said processor for storing a subset of information from said subset of multimedia streams into a single unified cache on said long term storage device; and

a computer interface, said computer interface for selectively outputting information from said subset of multimedia streams.

2. The apparatus of claim 1 wherein said first wireless encoded digital multimedia signal comprises a satellite broadcast signal.

3. The apparatus of claim 1 wherein said first wireless encoded digital multimedia signal comprises a terrestrial digital television broadcast signal.

4. The apparatus of claim 1 wherein each multimedia stream comprises Internet Protocol (IP) packets.

5. The apparatus of claim 1 wherein said first wireless encoded digital multimedia signal comprises MPEG-2 transport protocol.

6. The apparatus of claim 5 wherein each multimedia stream comprises Internet Protocol packets encapsulated within said MPEG-2 transport protocol.

7. The apparatus of claim 1 wherein said first wireless receiver circuit comprises a first ATSC digital television receiver circuit.

8. The apparatus of claim 7 wherein said second wireless receiver circuit also comprises a second ATSC digital television receiver circuit.

9. The apparatus of claim 1 wherein said first wireless receiver circuit comprises a direct video broad satellite receiver circuit.

10. The apparatus of claim 1 wherein said computer interface comprises a universal serial bus interface.

11. The apparatus of claim 1 wherein said processor executes a server program, said server program responding to requests received through said computer interface.

12. A method of distributing data, said method comprising:

broadcasting a first plurality of multimedia streams across a first broadcast medium;

broadcasting a second plurality of multimedia streams across a second broadcast medium;

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receiving said first and second plurality of multimedia streams in a data broadcast receiver system, said data broadcast receiver system having a first receiver circuit and a second receiver circuit for receiving said first and second plurality of multimedia streams across said first and second broadcast medium respectively;

caching a subset of said first and second plurality of multimedia streams in a single unified cache in said data broadcast receiver system; and

presenting a unified data service to a client system coupled to said data broadcast receiver system that comprises said subset of said first and second plurality of multimedia streams cached in said single unified cache on said data broadcast receiver system.

13. The method of distributing data as claimed in claim 12, said method further comprising:

receiving data information from a wired network into said data broadcast receiver system.

14. The method of distributing data as claimed in claim 12, wherein said wired network comprises the Internet.

15. The method of distributing data as claimed in claim 12, said method further comprising:

receiving in said data broadcast receiver system a query from said client system; searching said single unified cache for matching multimedia data that match said query from said client system; and

presenting a query response from said data broadcast receiver system to said client system that comprises said matching multimedia data.

16. The method of claim 12, said method further comprising:

encrypting said first and second plurality of multimedia streams.

17. The method of claim 16, said method further comprising:

searching a server system coupled to said wired network for matching multimedia data information that matches said query.

18. A method of providing data to a client computer system from a data broadcast receiver, said method comprising:

receiving a first data broadcast stream from a first broadcast medium in said data broadcast receiver;

receiving a second data broadcast stream from a second broadcast medium while simultaneously receiving said first data broadcast stream in said data broadcast receiver;

caching data from said first and second data broadcast streams in a single unified cache in said data broadcast receiver system;

receiving information requests from said client computer system coupled to said data broadcast receiver system; and

responding to said information requests by selectively providing information from said single unified cache in said data broadcast receiver system.

19. The method of claim 18, said method further comprising:

streaming digital information to said client computer system from said data broadcast receiver system through a computer interface.

20. The method of claim 18, said method further comprising:

decrypting data from said first and second data broadcast streams.

* * * * *



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Lawler et al.

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 [45] **Date of Patent:** **May 25, 1999**

[54] **INTERACTIVE PROGRAM SUMMARY
 PANEL**

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[73] **Assignee:** **Microsoft Corporation**, Redmond, Wash.

[21] **Appl. No.:** **08/969,979**

[22] **Filed:** **Nov. 13, 1997**

Related U.S. Application Data

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[51] **Int. Cl.**⁶ **H09N 5/445**

[52] **U.S. Cl.** **345/327; 348/7; 348/563; 348/906**

[58] **Field of Search** 455/5.1, 4.2, 4.1; 345/327; 348/6, 7, 10, 11, 12, 13

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Primary Examiner—Nathan Flynn

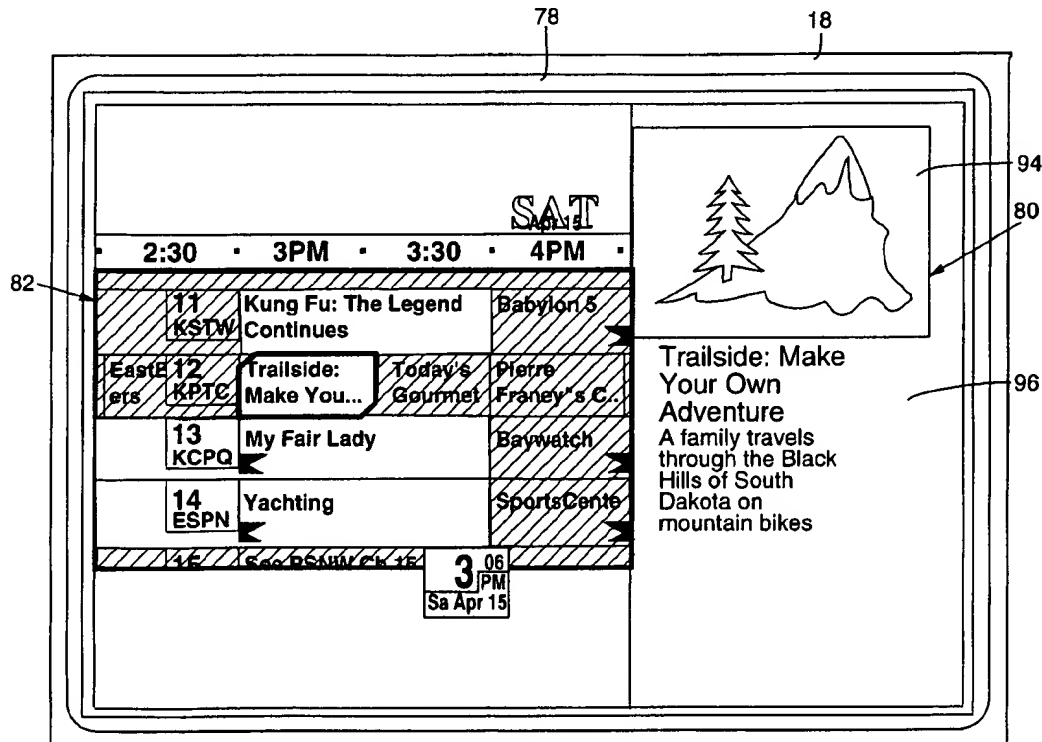
Attorney, Agent, or Firm—Klarquist Sparkman Campbell Leight & Winston, LLP

[57]

ABSTRACT

The present invention includes a method of displaying for a viewer summary information relating to programming available on an interactive television or televideo system. In a preferred embodiment, the method includes obtaining a user selection indication corresponding to a scheduled program selected by the viewer from a programming guide. Based on the user selection indication, the interactive television system accesses summary information relating specifically to the program selected by the viewer. The summary information preferably includes a text description of the programming and display imagery relating to the programming. The display imagery may include a multiframe video sequence of or relating to the programming or a still video image.

9 Claims, 5 Drawing Sheets



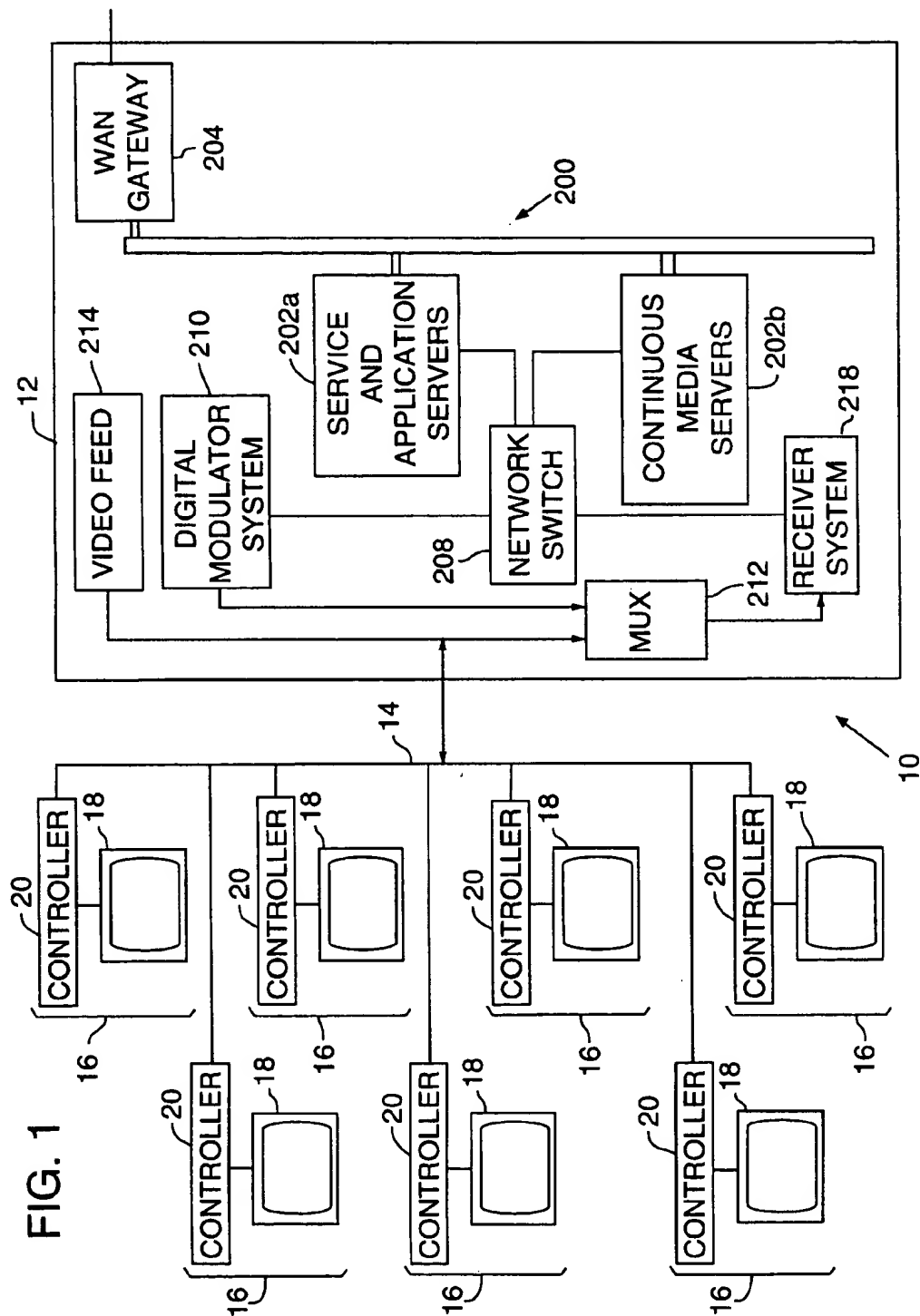


FIG. 2

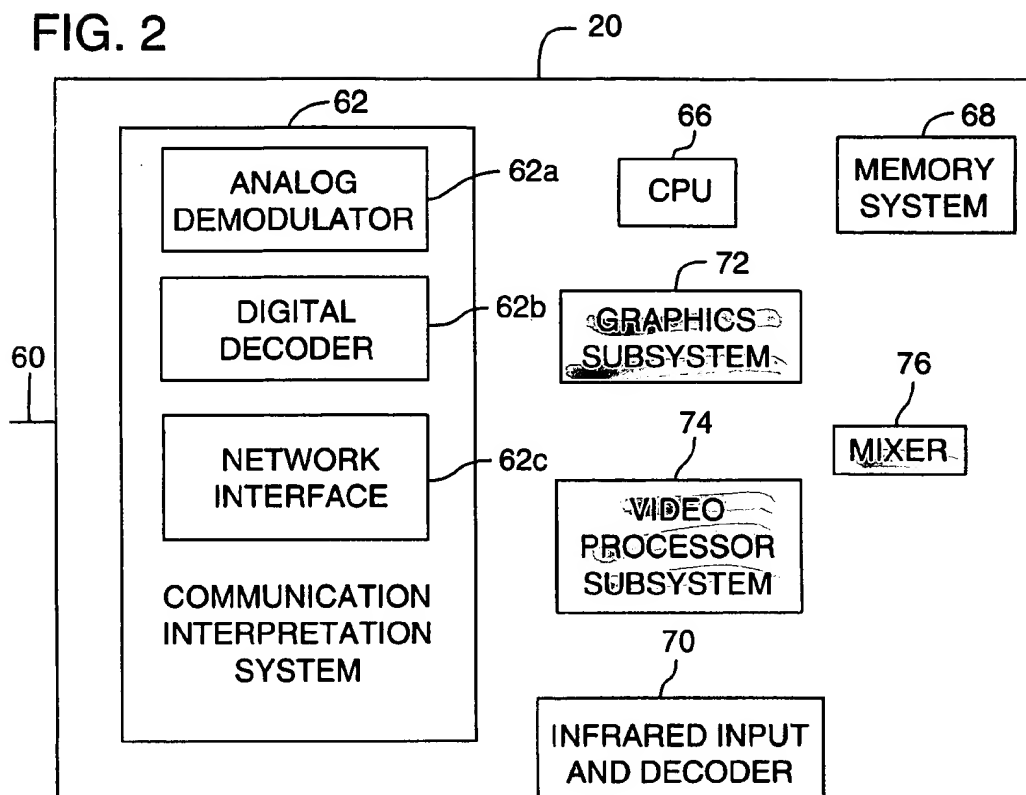


FIG. 6

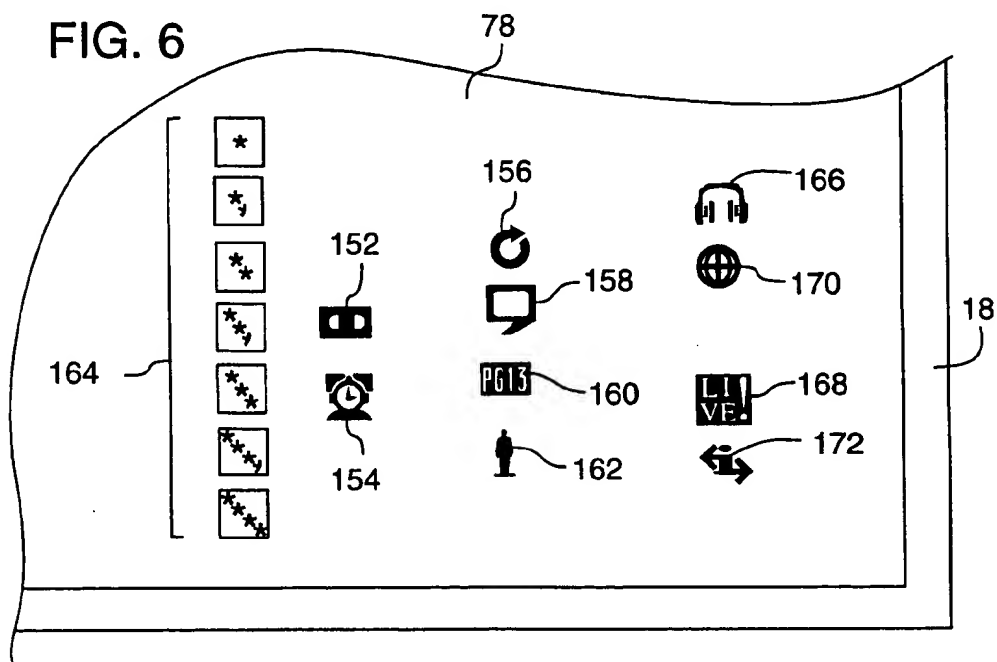


FIG. 4

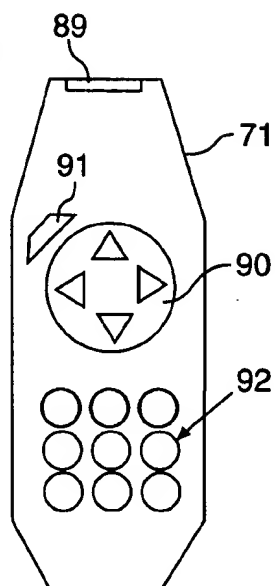
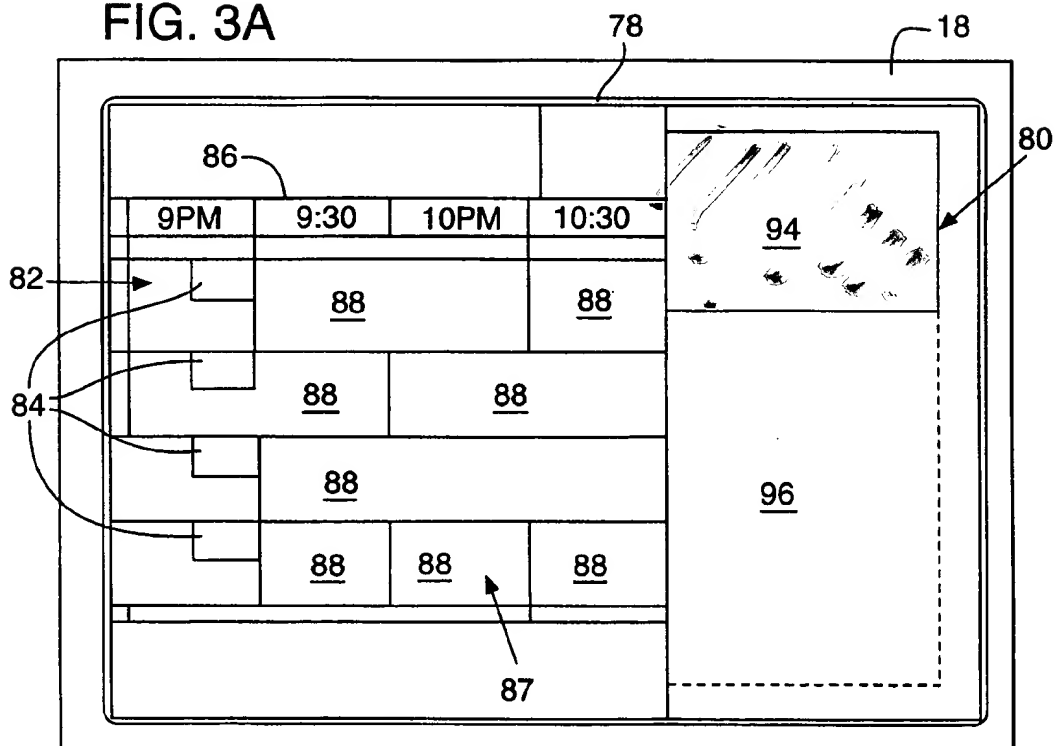


FIG. 3A



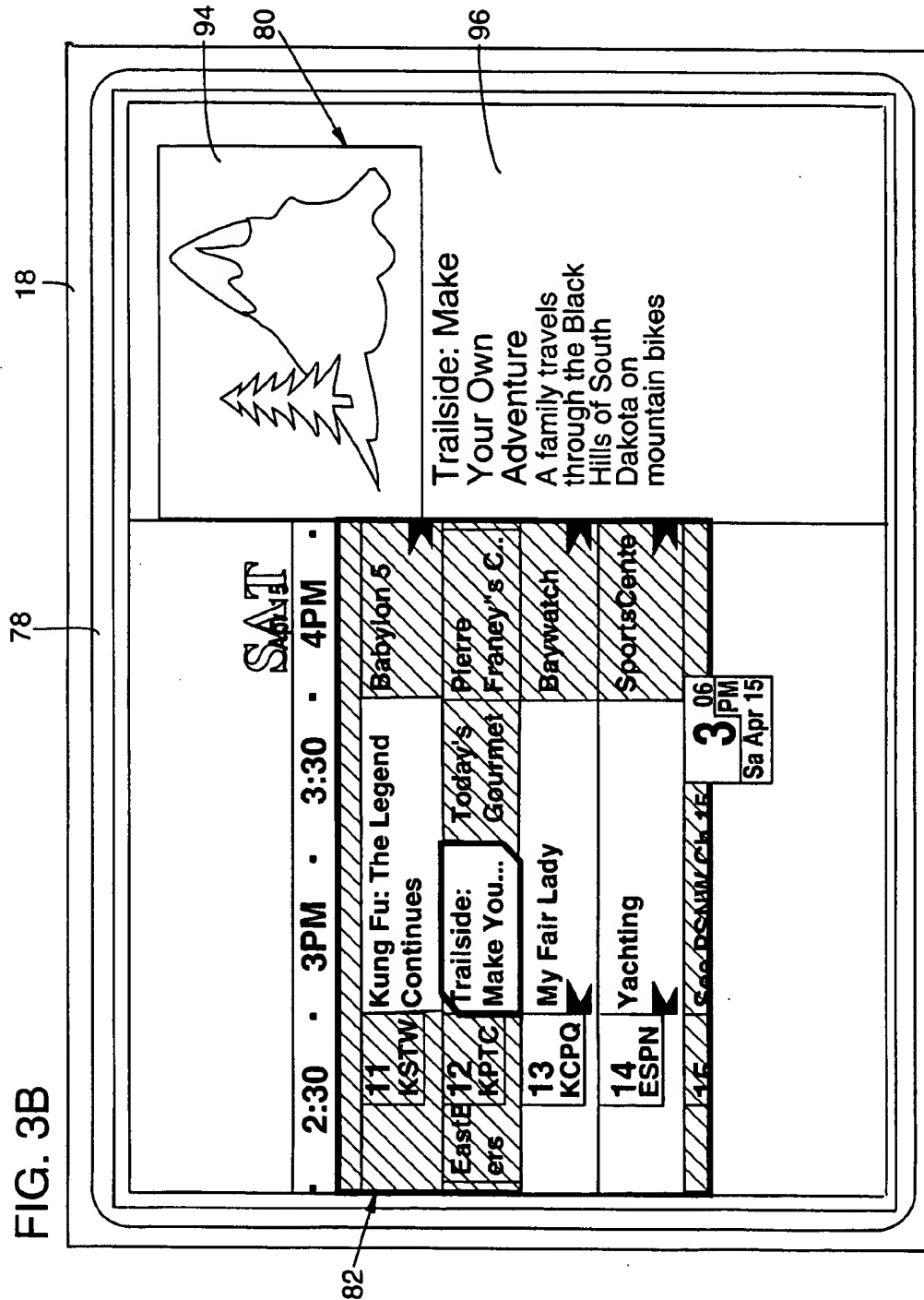
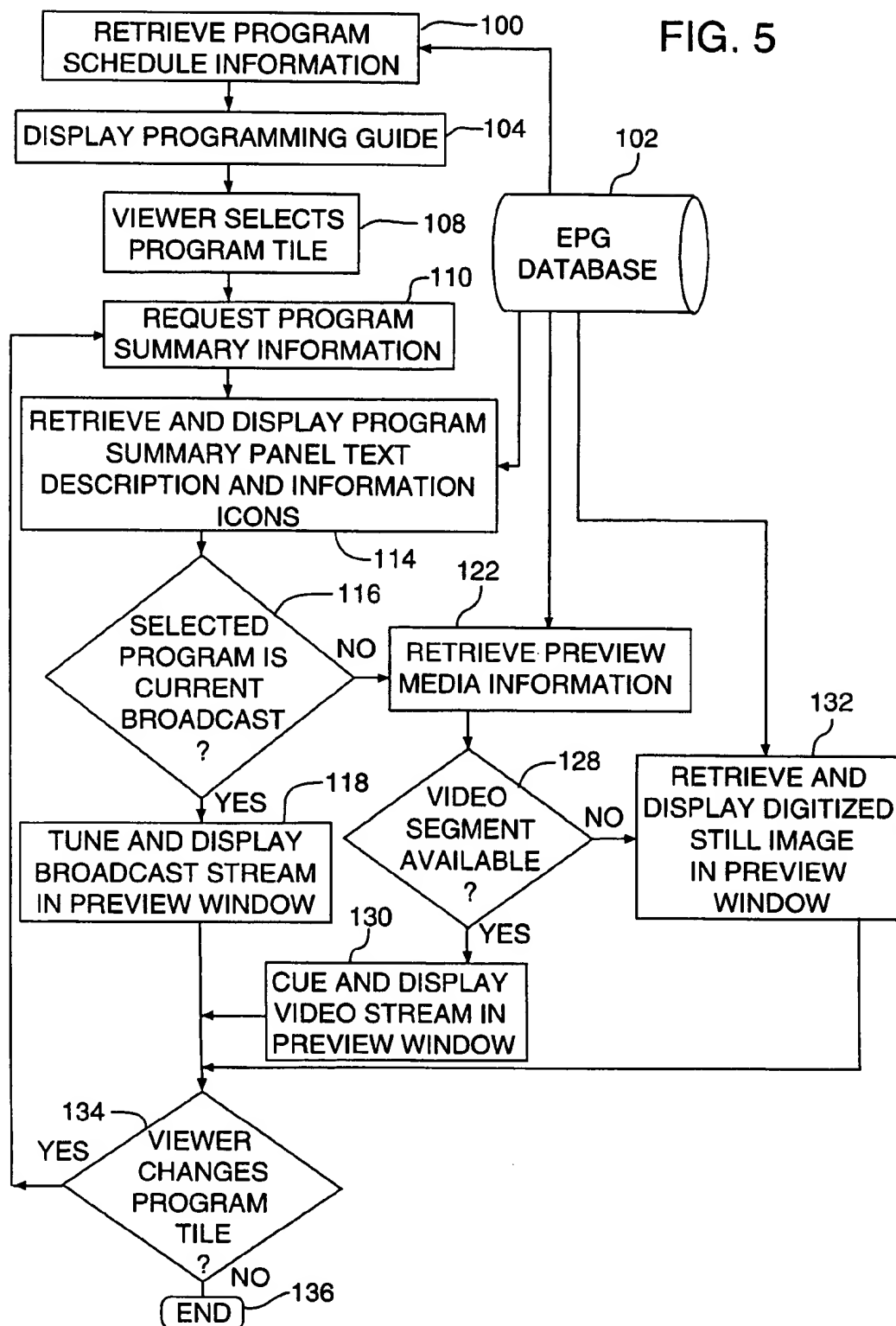


FIG. 5



INTERACTIVE PROGRAM SUMMARY PANEL

This application is a continuation of application Ser. No. 08/435,117, filed on May 5, 1995 now abandoned.

FIELD OF THE INVENTION

The present invention relates to interactive television or televideo systems and, in particular, to a method of providing viewers with information about programming available on such systems.

BACKGROUND OF THE INVENTION

Conventional cable and satellite television transmission is evolving into interactive television or televideo (IT) systems. IT systems combine the video broadcast capability characteristic of conventional broadcast television with computer-executed applications or programming responsive to input from viewers. By some estimates, IT systems under development could include the equivalent of 500 channels of programming, including video broadcasting and applications.

Meaningful access to large amounts of interactive television programming will require that viewers be able to obtain and comprehend vast amounts of programming and scheduling information. Conventional printed programming guides, such as T.V. Guide magazine or local newspapers, already provide only incomplete programming information for cable television networks with as few as 50 channels. It is expected that complete printed programming guides for the large amounts of programming in IT systems would be very large and expensive and unacceptably cumbersome.

Some conventional cable television networks dedicate a channel to a programming guide service, such as the Prevue Channel, Prevue Express, and Prevue Express Plus services provided by Prevue Networks, Inc. This conventional type of programming service lists the titles of programs scheduled for selected times. Typically, the titles of programs scheduled for about four television channels over a period of about two hours are listed simultaneously.

The service automatically scrolls through all or most of the channels available on the cable television network and automatically shifts the two-hour scheduling period shown according to the actual time. The same program schedule is delivered to all viewers on the cable television network. Viewers passively view the program schedule as it is scrolled.

In some systems, only about 60% of a viewer's television screen is used to show the program schedule. The remaining screen portion is used as an advertising window dedicated to broadcasting selected advertising or service identifications. One service that is frequently advertised in the advertising window of a programming guide is pay-per-view (PPV) television. Advertisements for PPV services often include video clips or segments relating to programs (e.g., motion pictures) available from the service.

The video content of the advertising window is the same for all viewers and is independent of the program schedule information that is shown simultaneously. The video content of the advertising window and the program schedule may even be generated from independent media or sources and mixed for broadcast on the dedicated programming guide channel.

At least one available system provides viewers with limited supplemental text descriptions regarding program-

ming listed on a television program schedule. The system requires the viewer to have special decoder equipment to intercept and decode television program schedule information that is transmitted automatically during the vertical blanking interval of a conventional television signal.

Only a limited amount of television program schedule information may be encoded and broadcast during each vertical blanking interval. Many automatic transmissions of this type are required to deliver all the program schedule information and supplemental text descriptions to the decoder equipment, where the decoded information is stored. The program schedule information and supplemental text descriptions can be displayed and viewed on demand after being loaded into the decoder equipment.

Transmitting the program information only automatically during the vertical blanking signal of a conventional television signal requires that the many fragments of program information be assembled over time in the viewer's decoder equipment. As a consequence, this system is limited to providing only brief text descriptions of programs and improves only slightly upon conventional program listings. Moreover, the supplemental text descriptions provided by this system obscure much of the program schedule information and therefore requires that the viewer switch between viewing the program schedule information and the supplemental text descriptions.

Conventional cable television program guide services provide only the title or brief text descriptions of the scheduled programming. Such extremely limited information typically requires supplementation by a printed video guide for a viewer to obtain meaningful program schedule information. In view of the expected shortcomings of printed schedule guides for IT systems and the limited information provided by conventional cable television program guides, IT systems will require improved methods of providing program information to viewers.

SUMMARY OF THE INVENTION

The present invention includes a method of displaying for a viewer summary information relating to programming available on an interactive television or televideo system. The IT system includes a central control node that delivers programming to multiple subscribers or viewers. Each viewer has a video display set (e.g., a television receiver) and an associated interactive controller that is responsive to input from the viewer for controlling programming on the video display set.

With reference to a preferred embodiment, the method of this invention includes obtaining a viewer selection indication corresponding to a program selected by the viewer from a programming guide. Based on the viewer selection indication, the IT system accesses summary information relating specifically to the program selected by the viewer. The summary information preferably includes a text description of the programming and display imagery relating to the programming. The display imagery may include a still video image or a multi-frame video sequence of or relating to the programming, together with an associated audio segment. The display imagery could also include the programming as it is being broadcast.

The text description and the display imagery are rendered on the display screen of the viewer's television receiver in a program summary panel that is positioned adjacent the programming guide from which the user selected the programming. The program summary panel includes a video preview window and a separate text window within which

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the respective display imagery and text description are rendered. The text window may also include one or more icons indicating that the program has selected characteristics. The associated audio segment preferably relates to the selected programming.

The present invention provides detailed information about scheduled programming for an arbitrary number of programming channels. No printed scheduling information is required. The availability of multi-frame video previews or direct broadcast transmissions provides programming information that viewers have not previously been able to obtain for selected programming.

The foregoing and other features and advantages of preferred embodiments of the present invention will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of an interactive television system used for the preferred embodiment of this invention.

FIG. 2 is a block diagram of an interactive station controller used for the preferred embodiment of this invention.

FIGS. 3A and 3B are respective block and stylized diagrams of a video display screen with a programming guide and a program summary panel of the present invention for summarizing selected programming.

FIG. 4 is a plan diagram of a viewer control unit for providing viewer input to the interactive station controller of FIG. 2.

FIG. 5 is a flow diagram of an interactive method of summarizing selected programming according to the present invention.

FIG. 6 is a diagram of a portion of a video display screen with exemplary icons for use in the program summary panel of FIG. 3.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

FIGS. 1 and 2 are directed to an interactive television or televideo (IT) system 10 as an operating environment for preferred embodiments of the present invention. For purposes of simplicity and clarity, IT system 10 is described with reference to widely available systems and standards, including conventional analog television receivers and cable-based video networks.

It will be appreciated, however, that the particular components of IT system 10 may be implemented with a variety of conventions, standards, or technologies without departing from the underlying concepts of the present invention. The term televideo is used to emphasize the applicability of this invention beyond standard television-based systems. As two examples, the conventional analog television receivers and cable-based video network referred to in FIGS. 1 and 2 could be implemented as digital video receivers and a satellite downlink transmission system, respectively.

FIG. 1 is a simplified block diagram of an interactive televideo (IT) system 10 having a central control node 12 that transmits programming over a network 14 to multiple viewer stations (e.g., homes) 16. The programming may include standard analog video broadcasts (e.g., NTSC, PAL or SECAM), digital or digitally encoded video broadcasts (e.g., MPEG1 or MPEG2), or digital information related to computer-executed applications.

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Each viewer station 16 includes at least one video display set 18 (e.g., a television receiver) and an interactive station controller 20, which is sometimes referred to as a set-top box. Although it is shown distinct from video display set 18, interactive station controller 20 could alternatively be integral with video display set 18.

Interactive station controllers 20 receive programming from central control node 12 and control the associated video display sets 18 in accordance with the programming. Controlling video display set 18 of a conventional analog type may include, for example, delivering an analog video signal directly to video display set 18 for display, converting a digital video signal to a suitable analog form for display, or executing a computer application that includes displays on display set 18.

Interactive station controllers 20 transmit digital information to and receive digital information from central control node 12. The digital information typically relates to applications executed by processors residing at control node 12 and station controller 20, as described below in greater detail.

Preferably, network 14 carries bidirectional communication between station controllers 20 and central control node 12. Alternatively, communication between station controllers 20 and central control node 12 can be carried by different communication systems. For example, programming from central control node 12 to station controllers 20 could be carried on a satellite downlink while station controllers 20 send information to central control node 12 on a terrestrial modem link. An exemplary embodiment of central control node 12 is described in greater detail below.

FIG. 2 is a simplified block diagram of an exemplary one of interactive station controllers 20 for controlling video display set 18 and communicating with central control node 12. Station controller 20 includes an input 60 that delivers communication or information from central control node 12 to a communication interpretation system 62 having, for example, an analog television demodulator 62a, a digital video decoder 62b, and a digital network communication interface 62c.

Demodulator 62a functions as a conventional television tuner for selecting one of multiple conventional analog video signals received from central control node 12 at input 60. Video decoder 62b functions as a digital equivalent of demodulator 62a for selecting one of multiple digital video signals received at input 60 from central control node 12. Network communication interface 62c communicates with central control node 12 with digital information carried over baseband frequencies. The baseband frequencies may be below the conventional analog video signal frequencies, above the digital video signal frequencies, or between the frequencies of analog or digital video signals.

A central processing unit (CPU) 66 in conjunction with a memory system 68 controls operation of station controller 20. CPU 66 is responsive to an infrared receiver and decoder system 70 that receives user input from a hand-held viewer control unit 71 (FIG. 4) and delivers the input to CPU 66. For example, CPU 66 controls selection of analog- or digital-based programming or applications delivered from central control node 12, accesses, activates, or executes selected applications, or delivers information to or requests information from central control node 12.

A graphics subsystem 72 is controlled by CPU 66 to form graphics images, including interactive system user interface images, on video display set 18. A video processor subsystem 74, also controlled by CPU 66, provides control in-

the rendering of video imagery, including decompressing digital video signals and sizing and positioning a video display window. A mixer 76 receives a video display signal from video processor subsystem 74 and graphics image signals from graphics subsystem 70 and delivers a mixed image signal to video display set 18. Mixer 76 provides compositing, masking and blending of display signals from two or more image sources such as, for example, a digital video signal and locally-generated graphics or an analog video signal and a bitmap image received from central control node 12.

FIGS. 3A and 3B show a display screen 78 of one of video display sets 18 with a program summary panel 80 of the present invention rendered thereon. Program summary panel 80 preferably is displayed in conjunction with a programming guide 82 that displays programming available for a particular date over a selected time range. Programming guide 82 includes a channel panel 84 identifying multiple particular channels or services (e.g., four channels or services), a time panel 86 listing particular times (e.g., a two hour time period in 30 minute increments), and a program grid 87 of program tiles 88 listing titles of programming on the identified channels at the listed times.

Referring to FIG. 4, viewer control unit 71 includes an infrared transmitter window 89 through which control unit 71 emits infrared signals to infrared input 70 of station controller 20. A directional control keypad 90 allows a viewer to transmit signals for moving a cursor (i.e., an indication of position) between tiles 88 on programming grid 86.

The cursor may be rendered on display screen 78 as a graphic character or icon or by changing the graphic characteristics of the program tile 88 where the cursor is positioned. The programming identified in a program tile 88 to which a viewer moves the cursor indication is referred to as being focused upon by the viewer or as focussed programming. The viewer may initiate or activate selections by depressing an action key 91 and may enter numeric values with numeric key pad 92.

Interactive station controller 20 generates a program summary panel 80 of the present invention for the programming focused upon by a viewer. Program summary panel 80 includes a preview display window 94 within which interactive station controller 20 renders display imagery relating to the focussed programming. The display imagery may include currently available video programming, an on-demand video clip or segment, or a still image, as described below in greater detail.

A text description window 96 displays a program title (preferably of a distinct font), a text description of the program, and one or more information icons relating to selected characteristics of the programming. Preferably, station controller 20 also provides an audio segment related to the selected programming.

FIG. 5 is a flow diagram showing an interactive method of displaying a summary of programming available on IT system 10.

Process block 100 indicates that program schedule information for a predetermined period is retrieved by interactive station controller 20 from an electronic programming guide (EPG) database 102 in central control node 12. The program schedule information includes, for example, program titles, broadcast times, and assigned channels, for a period of, for example, twenty-four hours. Interactive station controller 20 stores the program schedule information in memory system 68. Interactive station controller 20 preferably retrieves the

program schedule information upon startup and at periodic intervals after startup.

Process block 104 indicates that interactive station controller 20 displays a programming guide 82 on video display set 18. Preferably, central processing unit 66 cooperates with graphics subsystem 72 and the program schedule information stored in memory system 68 to render a graphic programming guide 82 of the type shown in FIG. 3.

Process block 108 indicates that a viewer selects or focuses upon a program tile 88 in programming guide 82 as described above, for example.

Process block 110 indicates that interactive station controller 20 accesses summary information about the programming focused upon by the viewer.

Process block 114 indicates that a summary text description of the selected programming and pointers to icons summarizing any selected information about the programming is retrieved from a memory included in IT system 10. Preferably, station controller 20 periodically (e.g., daily or weekly) receives from EPG database 102 summary text descriptions and related icon bitmaps for a predetermined time period and stores them in memory system 68. Station controller 20 retrieves from memory system 68 summary text descriptions and related bitmaps of any icons pointed to and displays the icons and summary text description for the viewer.

Alternatively, station controller 20 can retrieve from EPG database 102 the summary text descriptions and related bitmaps of icons that are not available in local memory 68 for the program tile 88 selected or focused upon by the viewer. Circumstances in which the summary text descriptions and related bitmaps of icons would not be available in local memory 68 include, for example, the viewer selecting a program tile 88 outside the predetermined time period for which the information is stored in memory 68, a video, graphic, or audio segment being associated with the information, or the information in memory 68 requiring an update or correction.

Decision block 116 represents an inquiry as to whether the selected programming is currently being broadcast and available to the user. Availability of the selected programming relates, for example, to whether the viewer is a subscriber to the selected programming. Decision block 116 proceeds to process block 118 whenever the selected program is currently being broadcast and available to the user and otherwise proceeds to process block 120.

Process block 118 indicates that communication system 62 tunes to the selected programming and displays it on video display set 18 within preview display window 94 of program summary panel 80. Video processor subsystem 74 functions to size and position the selected programming within preview display window 94.

Process block 122 indicates that central control node 12 retrieves preview media information from EPG database 102 or, alternatively, from memory 68 of station controller 20. The preview media information indicates whether the preview or display imagery available for the selected programming includes a video clip or segment of or relating to the selected program or a still image of or relating to the selected programming.

Decision block 128 represents an inquiry as to whether a digitized preview video clip or segment is available for the selected programming. Decision block 128 proceeds to process block 130 whenever a digitized video clip or segment is available and otherwise proceeds to process block 132.

Process block 130 indicates that the digitized video clip or segment is cued from an electronic programming guide (EPG) preview server computer at central control node 12 and transmitted to interactive station controller 20 for display to the viewer.

Preferably, the digitized video segment relates to the specific episode of the selected programming. If an episode-specific segment is not available, the digitized video segment preferably relates to any program series of which the selected programming episode is a part. If a series-specific segment is not available, the digitized video segment preferably relates to the channel carrying or broadcasting the selected programming.

Process block 132 indicates that a digitized still image is retrieved from EPG database 102 and transmitted to interactive station controller 20 for display to the viewer. Preferably, the still image relates to the specific episode of the selected programming. If an episode-specific still image is not available, the digitized still image preferably relates to any program series of which the selected programming episode is a part. If a series-specific still image is not available, the digitized still image preferably relates to the channel carrying or broadcasting the selected programming.

Decision block 134 represents an inquiry as to whether the viewer has selected or focused on a different program tile 88. Decision block 134 returns to process block 110 if the viewer has selected or focused on a different program tile 88 and otherwise proceeds to end block 136.

A digitized audio segment may be retrieved from EPG database 102 for playing with each digital video segment or still image. The audio segment may include one or more of a voice announcement, an audio portion of the selected programming, or music. The accessing and retrieval of audio segments would be substantially the same as the accessing and retrieval of still images or digitized video segments.

Preferably, the audio segment relates to the specific episode of the selected programming. If an episode-specific segment is not available, the digitized audio segment preferably relates to any program series of which the selected programming episode is a part. If a series-specific segment is not available, the digitized audio segment preferably relates to the channel carrying or broadcasting the selected programming.

The method described above is directed to an IT system 10 in which selected information is stored at and retrieved from EPG database 102 or EPG preview server 131 at central control node 12. The benefits of the present invention could also be achieved in IT systems having some or all of the selected information stored at and retrieved from interactive station controllers.

The availability of text description, information icons, and display imagery for use in program summary panel 80 is based upon an electronic programming guide (EPG) database managed within central control node 12, as described below in greater detail. The EPG database preferably includes the following tables:

- i) an episode table containing records for each interactive or broadcast televideo episode;
- ii) a series table containing records for each interactive or broadcast series;
- iii) a still image table comprising bitmaps or vector graphic definitions of still-image previews or pointers to computer files containing such stillimage previews;
- iv) an audio table containing digitized audio digital wave synthesis definitions or MIDI (Musical Instrument

Digital Interface) note and timing definitions of music and voice-over previews or pointers to computer files containing such audio previews;

- v) an audio/video table containing digitized video and audio, either in MPEG, AVI, Quicktime or other digital video format for full-motion video and audio storage, or pointers to computer files containing such video previews;
- vi) a tuning information table containing broadcast, cablecast or satellite transmission tuning information for channel lineups available to viewers, including network and affiliation information; and
- vii) a programming characteristic table containing broadcast properties or characteristics such as closed captioning and viewer discretion advised, which include pointers to image definitions of associated descriptive icons.

Within the EPG database, each programming event or episode record is linked to a parent series record. One-time programming events or specials have a single episode record linked to a single series record. Each episode record can have pointers to episode preview or display imagery in still image, audio, or multi-frame digital video format. Each episode may also be linked to selected broadcast properties that identify selected characteristics of the episode.

Similarly, each series record may have pointers to previews or display imagery relating to the series in still image, audio, or multi-frame digital video format, or selected broadcast properties that identify selected characteristics of the series. Also, each channel record may have pointers to previews or display imagery relating to the channel in still image, audio, or multi-frame digital video format, or selected broadcast properties that identify selected characteristics of the channel. The term channel refers to a provider of programming and can include, for example, a broadcast network or an application provider.

Retrieval of text description, information icons, and preview display imagery entails correlating the programming selected or focused upon by the viewer with the corresponding episode record. Any pointers in the record to program summary information are tracked and the information is retrieved. If no pointers to program summary information are associated with the episode, the programming selected by the viewer is correlated with the corresponding series record in the series table. Any pointers to series-specific program summary information are tracked and the information is retrieved.

If the series record contains no pointers to program summary information, a default still image or graphic retrieved for rendering within preview window 94. The default still image may be a channel-specific image or graphic for the channel carrying or transmitting the selected programming or a predetermined IT system or EPG image or graphic.

Table 1 below lists the preferred display imagery rendered in preview display window 94 of program summary panel 92 for different types of programming on IT system 10. The display imagery in preview display window 94 preferably is the currently broadcasting programming for focused programming available to the viewer. Programming available to the viewer includes the programming to which the viewer subscribes, including premium programming services.

TABLE 1

Type of Service/ Channel Selected	Broadcast Preview	Continuous Media Server Preview	Still Preview
Audio on demand	NO	If bandwidth available	YES
Current or future PPV broadcast	If limited in some way (for example timed preview, disabled audio or alternate audio track)	If bandwidth available	Likely
Current broadcast (not PPV)	Always	NO	NO
Electronic Program Guide	NO	NO	YES
Future broadcast (not PPV)	NO	First choice if bandwidth available	Second choice
Interactive service	NO	First choice if bandwidth available	Second choice
Past broadcast (PPV/Continuous Media Server archive)	NO	First choice if bandwidth available	Second choice
NVOD service	First choice - asynchronous loop	NO	Second choice - still carousel
VOD service	NO	First choice if bandwidth available	Second choice

Rendering the selected programming in preview display window 94 could also be used in connection with current or future pay-per-view (PPV) broadcasts, if the preview were limited until the viewer elects or subscribes to the broadcast. An asynchronous loop of broadcast previews could be rendered in preview display window 94 for near-video-on-demand (NVOD) services.

An asynchronous loop of broadcast previews could include non-specific video segments or trailers, or service advertisements, delivered simultaneously to all viewers and thus requiring no media server load or dedicated media server channels. A broadcast preview could be implemented for each of the other listed services with an asynchronous loop of broadcast previews carried on a dedicated channel.

Video clips or segments of multiple frames would preferably be rendered in preview display window 94 for future non-PPV broadcasts, interactive services such as news-on-demand or an interactive game service, past broadcast services, video-on-demand (VOD) services, and if, bandwidth is available on network 14, audio-on-demand and current or future PPV broadcasts. In connection with all types of service, still images could be rendered in preview display window 92 as a system backup or due to limited system capability.

FIG. 6 is a front view of a display screen 78 of an exemplary video display set 18 showing icons 150 that are selectively rendered individually or together within the text description window 94 of program summary panel 90. It will be appreciated that icons 150 are exemplary and that different icons representing the same or different information may be used in accordance with the present invention.

A VCR record icon 152 indicates that the selected program has been cued by the viewer for future recording by a video cassette recorder (VCR) at the viewer's station 16. A reminder icon 154 indicates that the selected program has been cued by the viewer for generating a reminder briefly before the start of the program. A re-run icon 156 indicates that the selected program is a re-run (i.e., a re-broadcast) of a first-run program series.

Closed captioning icon 158 indicates that the selected programming includes closed captioning text for hearing-impaired viewers. Audience rating icon 160 (as shown as an exemplary PG-13 rating) represents an audience rating applied to a motion picture by the Motion Picture Advisory Association, or other indications such as "viewer discretion advised". Awards icon 162 indicates that the selected programming is an award program such as, for example, the motion picture Academy Awards. Star rating icons 164 represent critical ratings as applied, typically, to motion pictures.

Stereo icon 166 identifies the selected programming as including a stereo audio component. Live icon 168 indicates that the selected program is a live broadcast. Premium icon 170 indicates that the selected programming is a part of a premium or surcharge service available over network 14. Interactive icon 172 identifies the selected programming as an interactive show or service. In addition to icons 150, it will be appreciated that other icons could be used to identify selections of interactive system services, specialized audio capabilities (e.g., Dolby® or THX®), or customized program-specific icons identifying, for example, college or professional sports.

Preferably, icons 150 are stored at central control node 12 as bitmap files and downloaded to interactive station controller 20 in response to pointers or other indicators associated with the text summary description information. Icons 150 are generated within text description window 94 in cooperation with graphics subsystem 72 of station controller 20.

Referring to FIG. 1 central control node 12 includes a digital local area network (LAN) 200 with multiple computer servers 202 for performing various interactive system applications or functions. Servers 202 include, for example, multiple state-of-the art microprocessors that operate in parallel and access or control data storage devices with large data capacities. A digital communication gateway 204 couples LAN 200 to a wide area network (WAN) (not shown) for obtaining and delivering IT system information.

Servers 202 may include, for example, service and application servers 202a and continuous media servers 202b. Service and application servers 202a process interactive service requests from subscribers and provide services and applications associated with operation of IT system 10. Service and application servers 202a may be dedicated to particular applications such as an electronic programming guide for viewers, network security, monitoring, object storage, financial transactions, data access, and other administration functions.

Continuous media servers 202b provide storage and on-demand or near on-demand delivery of digitized video information. The digitized video information can include video programming of substantially any duration ranging from individual image frames and brief video clips to full-length motion pictures.

Servers 202 communicate with station controllers 12 via a network communication switch 208, such as an asynchronous transfer mode (ATM) switch. For communication from servers 202 to station controllers 20, network communication switch 208 arranges digital information received from servers 202 in a standard bidirectional digital communication format for transmission over network 14. For communication from station controllers 12 to servers 202, network communication switch 208 converts digital information from the standard bidirectional digital communication format for delivery to servers 202.

Digital information from servers 202 is frequency modulated by a digital modulator system 210 for transmission over network 14. Digital information that includes video programming is preferably modulated at frequencies greater than the standard analog television frequency range, which is 50-450 MHz under the NTSC television standard. Digital information that does not include video programming may be modulated at baseband frequencies that are less than the standard analog television frequency range.

A multiplexing system 212 receives and mixes the frequency modulated digital information from modulator system 210 and standard analog video signals obtained from a standard analog video feed 214 and delivers an IT composite signal to interactive network 14. Analog video feed may be or include a satellite downlink, a cable receiver, or any locally generated programming. A reverse channel receiver system 218 receives and demodulates digital communications from station controller 20 for processing by servers 202.

Having illustrated and described the principles of the present invention in a preferred embodiment, it should be apparent to those skilled in the art that the embodiment can be modified in arrangement and detail without departing from such principles. Accordingly, we claim as our invention all such embodiments as come within the scope and spirit of the following claims and equivalents thereto.

We claim:

1. In an interactive video system having a central control node in bidirectional communication with plural viewer stations that include video display sets operably coupled to interactive station controllers, the central control node delivering video programming over multiple channels to the plural viewer stations and receiving information from the interactive station controllers, the system including a programming guide which identifies a plurality of current programs which are currently being broadcast for viewing and a plurality of future programs which will be available for viewing in the future, the program guide allowing the viewer to navigate through the program guide to focus on and select a program included within the guide, a method of displaying for a viewer a video segment relating to programming included in the programming guide, comprising:

storing in a memory associated with the central control node of the interactive video system a plurality of video segments, each video segment being associated with at least one of said plurality of future programs available to a viewer from the interactive video system;

obtaining an indication at a viewer station of the selected program in response to the viewer focusing on the selected program;

whenever the selected program is one of the plurality of future programs, transmitting the indication of the selected program to the central control node, retrieving from the memory at the central control node in response to the transmitted indication the video segment associated with the selected program, transmitting

the video segment from the central control node to the viewer station, and displaying the video segment for the viewer on a video display set simultaneously with the programming guide; and

whenever the selected program is one of the plurality of current programs, forming the video segment associated with the selected program from the broadcasted programming and displaying the video segment for the viewer on the video display set simultaneously with the programming guide.

2. The method of claim 1 further comprising;

storing in the memory associated with the interactive video system a text description relating to the programming available to a viewer; and

retrieving from the memory in response to the viewer focussing on the selected program the text description corresponding to the selected program by the viewer from the programming guide and displaying the text description with the video segment for the viewer on the video display set.

3. The method of claim 2 in which the text description and video segment are displayed in, respectively, a text description window and a preview display window that are displayed adjacent each other.

4. The method of claim 2 in which the text description displayed for the viewer includes an icon indicating a predetermined characteristic of the selected programming.

5. The method of claim 4 in which the predetermined characteristic of the selected programming is selectively cued by the viewer.

6. In an interactive video system having a central control node in bidirectional communication with plural viewer stations that include video display sets operably coupled to interactive station controllers, the central control node delivering video programming over multiple channels to the plural viewer stations and receiving information from the interactive station controllers, the system including a programming guide which lists a plurality of current programs which are currently being broadcast for viewing and a plurality of future programs which will be available for viewing in the future, the program guide allowing the viewer to navigate through the program guide and focus on a selected program included within the program guide, a memory associated with the interactive video system, comprising:

programming summary information maintained at the central control node that relates to the selected program and for at least the plurality of future programs includes multi-frame video segments relating to the selected program;

processor control instructions in response to the user focusing on the selected program which cause the interactive video system to obtain a user selection indication corresponding to selected program;

processor control instructions in response to the user selection indication which cause the interactive video system to determine whether the selected program is one of the plurality of future programs;

processor control instructions in response to a determination that the selected program is one of the plurality of future programs which cause the interactive video system to access at the central control node in accordance with the user selection indication summary information relating to the selected program

processor control instructions in response to the user selection indication which cause the interactive video

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system to determine whether the selected program is one of the plurality of current programs;
processor control instructions in response to a determination that the selected program is one of the plurality of current programs which cause the interactive video system to generate a video segment associated with the selected program from the broadcast program and associate the generated video segment with the summary information for the selected program;
processor control instructions in response to which the interactive video system displays the summary information and associated video segments for the viewer on the video display set at the viewer station in a program summary window adjacent the programming guide.

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7. The memory of claim 6 in which the programming summary information further includes a text description relating to the programming available to the viewer.

8. The memory of claim 6 in which the programming summary information further includes a still image relating to at least one of the plurality of future programs available to the viewer.

9. The memory of claim 6 in which the programming summary information includes multiple icons corresponding to predetermined characteristics of the programming available to the viewer.

* * * * *

L Number	Hits	Search Text	DB	Time stamp
1	0	@ay<2000 and (video adj5 SRC adj5 (channel\$1 frequen\$4))	USPAT;	2004/07/09 15:49
-	1	20020069411.pn.	US-PGPUB	2004/07/08 14:01
-	317	725/109,110,112,136.ccls. and @ay<2000	USPAT;	2004/07/08 14:03
-	725	348/563,564,588.ccls. and @ay<2000	US-PGPUB	2004/07/08 14:03
-	763	715/513.ccls. and @ay<2000	USPAT;	2004/07/08 14:03
-	50	348/510.ccls. and @ay<2000	US-PGPUB	2004/07/08 14:03
-	210	725/41,42,43,40.ccls. and @ay<2000	USPAT;	2004/07/08 14:05
-	1169	725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000	USPAT;	2004/07/08 14:06
-	3	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and (graphic\$1 with video\$1 with HTML\$1)	USPAT;	2004/07/08 14:35
-	3	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and (graphic\$1 near10 video\$1 near10 HTML\$1)	USPAT;	2004/07/08 14:35
-	62	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and (combin\$3 near10 graphic\$1 near10 video\$1)	USPAT;	2004/07/08 14:44
-	8	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and (combin\$3 near10 (internet\$1 WWW\$1 HTML\$1 web\$1 website\$1) near10 video\$1)	USPAT;	2004/07/08 14:42
-	180	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and ((combin\$3 overla\$3) near10 (graphic\$1 image\$1 icon\$1) near10 video\$1)	USPAT;	2004/07/08 14:45
-	1	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and ((combin\$3 overla\$3) near10 (graphic\$1 image\$1 icon\$1) near10 video\$1) near10 (internet\$1 web\$1 WWW\$1 HTML\$1)	USPAT;	2004/07/08 14:51
-	10	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and ((combin\$3 overla\$3) near10 (graphic\$1 image\$1 icon\$1) near10 video\$1 near10 pixel\$2)	USPAT;	2004/07/08 16:04
-	7	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and ((combin\$3 overla\$3) near10 (graphic\$1 image\$1 icon\$1) near10 video\$1 near10 (transparen\$3 translucen\$3))	USPAT;	2004/07/08 16:06
-	170	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and ((transparen\$3 translucen\$3))	USPAT;	2004/07/08 16:06
-	35	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and ((transparen\$3 translucen\$3) near10 (control\$4 level\$1))	USPAT;	2004/07/09 08:00

-	215	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and (video\$1 near10 (siz\$3 resiz\$3))	USPAT; US-PGPUB	2004/07/09 08:01
-	37	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and (video\$1 near10 (siz\$3 resiz\$3) near10 control\$3)	USPAT; US-PGPUB	2004/07/09 08:20
-	32	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and (video\$1 near10 (siz\$3 resiz\$3) near10 position\$3)	USPAT; US-PGPUB	2004/07/09 08:46
-	51	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and (video\$1 near10 (HTML\$1 web\$1 internet\$1) near10 page\$1)	USPAT; US-PGPUB	2004/07/09 09:44
-	16	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and (video\$1 near10 (HTML\$1) near10 page\$1)	USPAT; US-PGPUB	2004/07/09 09:45
-	0	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000)) and (video\$1 near10 (HTML\$1) near10 statement\$1)	USPAT; US-PGPUB	2004/07/09 09:45
-	0	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000) (345/760,717,629,634,638.ccls. and @ay<2000) (715/500.1,513.ccls. and @ay<2000)) and (video\$1 near10 (HTML\$1) near10 statement\$1)	USPAT; US-PGPUB	2004/07/09 09:47
-	91	((725/109,110,112,136.ccls. and @ay<2000) (348/563,564,588.ccls. and @ay<2000) (725/41,42,43,40.ccls. and @ay<2000) (345/760,717,629,634,638.ccls. and @ay<2000) (715/500.1,513.ccls. and @ay<2000)) and (video\$1 near10 (HTML\$1))	USPAT; US-PGPUB	2004/07/09 10:01
-	1	@ay<2000 and (HTML\$1) and (video adj2 SRC)	USPAT; US-PGPUB	2004/07/09 10:06
-	6	@ay<2000 and (video adj2 SRC)	USPAT; US-PGPUB	2004/07/09 10:09
-	0	@ay<2000 and (video adj5 SRC adj5 "=")	USPAT; US-PGPUB	2004/07/09 10:09
-	12	@ay<2000 and (video adj5 SRC)	USPAT; US-PGPUB	2004/07/09 10:10